ANNUAL REPORT
Provincial Board of Health
1909

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Twenty-Eighth Annual Report

OF THE

Provincial Board of Health

OF

Ontario, Canada

FOR THE YEAR

1909

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

UNIVERSITY OF TORONTO
DEPARTMENT OF PATHOLOGY

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To His Honour John Morison Gibson, K.C., LL.D.,
Lieutenant-Governor of the Province of Ontario.

May It Please Your Honour,—I herewith beg to present for your consideration the Twenty-eighth Annual Report of the Provincial Board of Health for the year 1909.

Respectfully submitted,

W. J. Hanna,
Provincial Secretary of Ontario.

To Honourable W. J. Hanna,
Provincial Secretary of Ontario.

Sir,—I have the honour to submit for your approval the Twenty-eighth Annual Report made in conformity with and under the provisions of the Public Health Act for the year 1909.

I have the honour to be,

Sir,

Your obedient servant,

Chas A Hodgetts

Chief Health Officer of Ontario.

PROVINCIAL BOARD OF HEALTH OF ONTARIO
1909.

Minister in Charge of the Department.

Hon. W. J. Hanna,
Provincial Secretary

Members.

Charles Sheard, M.D., M.R.C.S., Eng., M.H.O., *Chairman*	Toronto
Milton Ira Beeman, M.D., M.H.O.	Newburgh
John William Scott McCullough, M.D.	Alliston
William Robert Hall, M.D., M.H.O.	Chatham
Charles Alfred Hodgetts, M.D., L.R.C.P., Lond.	Toronto

Secretary and Chief Health Officer of Ontario.

Bacteriologist in charge of Laboratories.

John A. Amyot, M.D.

Branch Laboratory—Kingston.

W. T. Connell, M.D.

Medical Inspector.

R. W. Bell, M.D.

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Resume of the Transactions of the Board

For the Year ending December 31st, 1909.

BY THE SECRETARY.

During the fiscal year ending October 31st, 1909, the Board held three regular and one special meetings. One session of the latter was convened in the town of Lindsay, when the Board inspected the water purification plant, which had recently been installed by the Board of Water Commissioners.

Applications were received from the municipalities of Burlington, Markdale and Weston for the approval of plans for public water supplies. The Engineer's Reports and Reports of the Medical Inspector thereon will be found on pages

The source of supply for Burlington was by means of a collecting well or gallery situated on the sandbar lying between Lake Ontario and Burlington Bay, while that of Markdale is from a creek at present uncontaminated. The Weston supply will be taken from the Humber River, sedimented and subsequently filtered. All three plans were approved of by the Board.

Two municipalities, Cobalt and Rainy River, submitted plans for both waterworks and sewerage systems. The Cobalt plans were approved of by the following resolution:—"That the water supply of the Town of Cobalt, as per plans submitted, taking supply from Lake Sassaginaga with filtration be approved by the Board. Also that the sewerage system of the said town, as per plans submitted, be approved."

The Secretary having made a personal visit to the town of Rainy River reported verbally upon the propositions. They were approved of in the following resolution:—"That both the waterworks and sewerage plans of the town of Rainy River be approved of and the powers of sec. 30, s.s. 6, of the Public Health Act be given the municipality in respect to pollution of the waters of Rainy River to the shores of the same as far as the easterly limit of the Manitou Reserve, and to all creeks and rivers tributary thereto within the said limits of Rainy River."

The plans submitted by the City Council of the City of London in respect to a series of Artesian wells, the waters of which are to supplement the present supply, were duly considered, together with the laboratory findings of a series of specimens collected by an officer of the Board, and were approved.

The plans received from the Councils of the following municipalities for the construction of sewerage systems were approved of:—

New Toronto.—See Engineer's report. These plans provided for a disposal plant at outfall.

North Toronto.—Provisional plans, including disposal plant, as however ratepayers had not as yet taken final action thereon, the details are not published.

For various reasons there is a greater interest being taken in the construction of Sewage Disposal plants, and the Board approved of those of St. Thomas, Palmerston, Stratford and Guelph. In regard to the plans of the latter, they were approved of by the following resolution:—

"That the Board do approve of the plans submitted by the City of Guelph regarding the Disposal of Sewage on the understanding that in carrying out these plans precaution will be taken to so elevate the tanks and filter beds as to place them beyond danger of flooding during river freshets, and that underdrainage will be provided at all times; that the tank sludge will be regularly and carefully removed from tanks and so treated at the time of removal by lime or otherwise as to prevent its causing a nuisance."

The application of the town of Barrie for approval of a plan of sewers for the newly added portion of the municipality was referred back, and was subsequently amended so as to provide for the tankage of the effluent before being discharged into the waters of Lake Simcoe. The amended plans were approved. The plans of the sewerage system of the town of Dunnville were approved of with additions.

The town of Burk's Falls installed some years ago a waterworks system which was not formally approved of by the Board. The water having proved of an unsatisfactory character the municipality appealed to the Board for expert assistance to suggest what could be done to improve the same, and the report of Mr. T. Aird, C.E., upon the subject will be found in page 72.

The work of the office of the Secretary for convenience of discipline may be divided into

(*a*) Medical Inspection.
(*b*) Laboratories.
(*c*) Experimental.
(*d*) Educational.

The medical work is performed chiefly by Dr. R. W. Bell, who personally visits a municipality when the occasion arises, his work brings him closely into touch with municipal authorities, and many are the local difficulties which are smoothed out and effectively settled by his good tact and wise counsel. The doctor's chief reports will be found in the body of the report.

The Laboratories in the sphere of routine work are year by year doing an increasing amount of work. The demands upon the Toronto Laboratories, both Chemical and Bacteriological, have very largely increased during the past few years, as will be seen by the report of Dr. Amyot, while in the chemical division the work of Dr. Nasmith in respect to the examination of specimens for the License Department, with the special work performed from time to time for other branches of the service, have altogether apart from the work relating to water and sewage specimens, been of great value to the Province.

The experimental plant, which work is being carried on in respect to water filtration and sewage treatment, has, after considerable and altogether unavoidable delays been placed in running order under the immediate oversight of an engineer. It will, however, be some time before any report of marked interest to municipal authorities along the lines of water filtration and sewage treatment can be made. The work is the first of its kind to be carried on in Canada, and a large amount of important and interesting information will in the near future be available here.

Considering the small number of clerks employed in the office of the Board the distribution of sanitary literature has been considerable, and local health authorities are now appreciating the value of the pamphlets relating to contagious diseases. During the year many thousands of pamphlets relating to Measles, Scarlet Fever, Smallpox, Vaccination, Whooping Cough, Typhoid Fever, Diphtheria and

Consumption have been sent out to Local Boards of Health for general distribution, and it is found that this method of educating the public in the presence of a threatened outbreak of a particular disease not only meets with the approval of the public but is being made use of by Local Boards of Health, and fully warrants the action of the Provincial Board in the preparation and free distribution of such literature.

The Tuberculosis Exhibit continues to be an important factor in the educational work now going on in the Province. The important points visited during the year were Galt, Guelph, Alliston, Creemore, Hamilton and St. Catharines. It was also a prominent feature during the meetings of the International Congress of the Council of Women, which convened in the City of Toronto, and by request it was opened during the Tenth Canadian Conference of Charities, held also in the City of Toronto in the month of October.

The local medical practitioners have given addresses to the school children and the general public, and the lantern with the several hundred slides has been of inestimable value in educating both old and young in regard to the white plague, its extent, its cause of dissemination, its prevention and the many methods of dealing therewith, while three special pamphlets relating to the disease have been freely distributed. During the meeting of the Congress of the International Council of Women the exhibit was open for two weeks in rooms specially set apart for that purpose by the local committee, and attracted a large number of visitors. Especial interest was shown by the President, the Countess of Aberdeen, who expressed her great pleasure at the completeness of the exhibit and the manner in which it was set up.

Unfortunately, at the time of the fire in the Parliament Building, a large number of the pictures and illustrations were destroyed by water, and for some months the exhibit was out of commission.

CHAPTER 85.

An Act to Amend the Public Health Act.

(*Assented to April* 10, 1909.)

HIS MAJESTY, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:

Rev. Stat. c. 248, s. 13 amended.

1. Section 13 of *The Public Health Act* is amended by striking out the words "Whenever this Province or any part thereof or place therein appears to be threatened with any formidable epidemic, endemic, or contagious disease, in man or animals."

Sec. 57 amended.

2. Section 57 of the said Act is repealed and the following substituted therefor:

Payment of accounts certified by board.

57. The treasurer of the municipality shall forthwith, upon demand, pay out of any moneys of the municipality in his hands the amount of any account for services performed under the direction of the board by virtue of this Act after a resolution of such board approving of the account and certified by the chairman and secretary thereof has been filed in the office of the treasurer of the municipality.

Sec. 103 amended.

3. Section 103 of the said Act is amended by striking out the words "smallpox, cholera, scarlatina, diphtheria, whooping cough, measles, mumps, glanders or other contagious disease" wherever they occur in the said section and substituting therefor the words "such infectious or contagious diseases as may be designated from time to time by the Provincial Board of Health."

Sec. 103 amended.

4. Section 103 of the said Act is further amended by adding the following subsection:

(2*a*) No child having suffered from such disease shall be allowed to attend school within the minimum time thereafter prescribed by the Provincial Board of Health respecting such diseases.

Schedules amended.

5. All the Schedules to *The Public Health Act* are hereby amended to conform with the provisions of this Act.

Report of the Secretary of the Monthly Morbidity and Mortality Statistics of Communicable Diseases as reported by Municipal Clerks for the Year ending December 31st, 1909.

Number of Divisions (Municipalities) Reporting.	Months.	Smallpox.		Scarlatina.		Diphtheria.		Measles.		Whooping Cough.		Typhoid.		Tuberculosis.	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
731	January	122	0	322	16	341	42	42	2	83	14	72	24	158	151
745	February	183	0	348	18	238	32	23	8	125	15	64	26	146	131
750	March	98	1	197	15	285	33	19	6	48	13	113	34	206	203
745	April	126	0	247	14	148	21	56	9	74	8	63	26	185	178
703	May	87	0	277	16	186	34	140	20	68	14	66	25	175	169
735	June	60	0	266	8	176	21	88	23	29	8	72	22	154	151
481	July	19	0	251	18	156	24	45	18	46	9	126	18	128	104
697	August	22	0	257	14	158	18	39	11	73	18	432	50	139	133
713	September	8	0	248	16	176	28	59	6	47	17	793	102	127	110
753	October	10	0	280	14	217	35	103	20	62	11	310	98	160	153
714	November	90	0	353	19	245	35	132	10	27	6	315	58	130	120
608	December	49	0	415	21	309	63	129	1	50	11	109	35	133	120
		874	1	3,461	189	2,635	386	857	134	732	144	2,535	578	1,841	1,723

THE TUBERCULOSIS MOVEMENT.

BY CHAS. A. HODGETTS, CHIEF HEALTH OFFICER.

During the year progress has been made in at least two of the cities of the Province, in the erection of buildings for the care of consumptives.

In the City of St. Catharines a movement was begun during the Fall of 1908 to establish an institution to take care of consumptive patients, and, under certain conditions, the Daughters of the Empire offered to lend their support and to help to collect money to build an institution. They immediately met with marked success, and the City Council passed a By-law authorizing a Sanatorium and appointed a Board of Trustees, consisting of seven ratepayers of St. Catharines, to take entire charge of the running of the same.

The property known as the Collier Homestead, overlooking Lock 5 of the old Welland Canal, was purchased, together with the adjoining six and one-half acres of land, and the work of rebuilding the old house was commenced about May 1st, 1909. On October 19th the Sanatorium was opened by the Honourable W. J. Hanna, Provincial Secretary.

Applications for admission began immediately to come in, and December 7th there were nine patients in residence. The capacity of the institution is fifteen beds, and from information received it would appear that the Board is already considering the advisability of erecting shacks.

The total expenditure upon the present building and ground has been in the neighbourhood of $10,000, while the furnishings have been contributed by the Daughters of the Empire. The entire cost has been paid for by private subscription and is entirely free from debt.

The main building consists of nurse's and maid's rooms, bathroom, office, consulting room and separate dining rooms for patients and staff. Also laundry, fumigating room and kitchen are on first floor. On the second floor there is one large and three small wards with bathroom convenience, two large verandahs enclosed with movable sash, so that they may be used as open-air bedrooms.

The staff consists of a trained nurse as matron and a maid, with two years' previous experience in a Sanatorium, and a caretaker.

The milk and eggs used for patients are the products of the institution, and next Spring it is contemplated that all vegetables will be grown on the grounds.

The Board of Trustees is as follows:—R. W. Leonard, Chairman; A. W. Taylor, Secretary-Treasurer; J. H. Ingersoll, J. A. McSloy, J. D. Chaplin, G. J. Armstrong, W. D. Woodruff.

For the accompanying illustrations I am indebted to A. W. Taylor, to whom I am also indebted for an account of the work.

The progress of the work in Ottawa is very concisely stated in a report furnished by the Secretary of the Ottawa Anti-Tuberculosis Association, as follows:

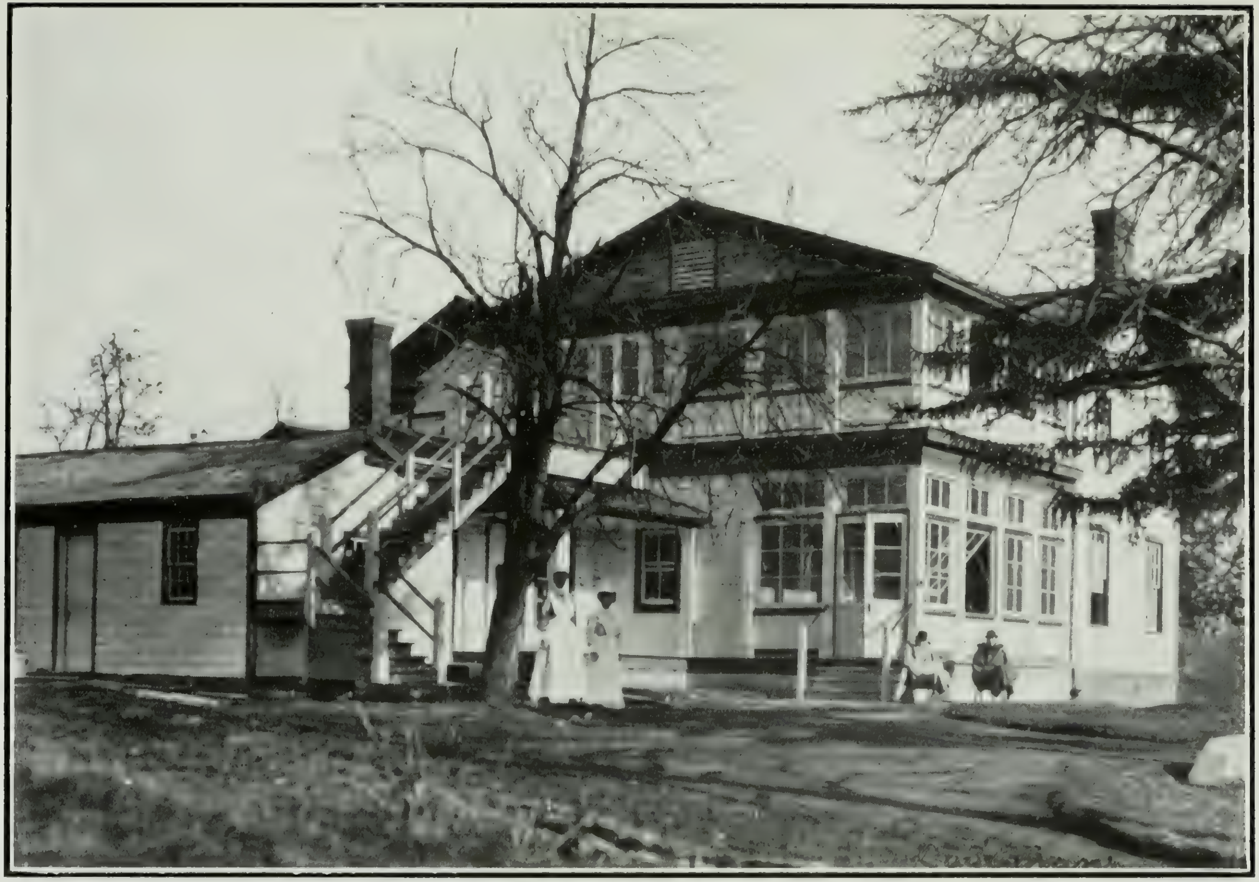
"In Ottawa the effort to do something to combat the ravages of the Great White Plague began under two organizations.

"1st. The Ottawa Auxiliary of the National Sanatorium Association, which was organized at a meeting held in the City Hall, September 28th, 1904, its purpose being:

"(*a*) To assist generally in all work having in view the prevention of Tuberculosis.

"(*b*) The transference to, and maintenance at Gravenhurst and Weston, near Toronto, of consumptive patients from Ottawa who may be unable to pay either

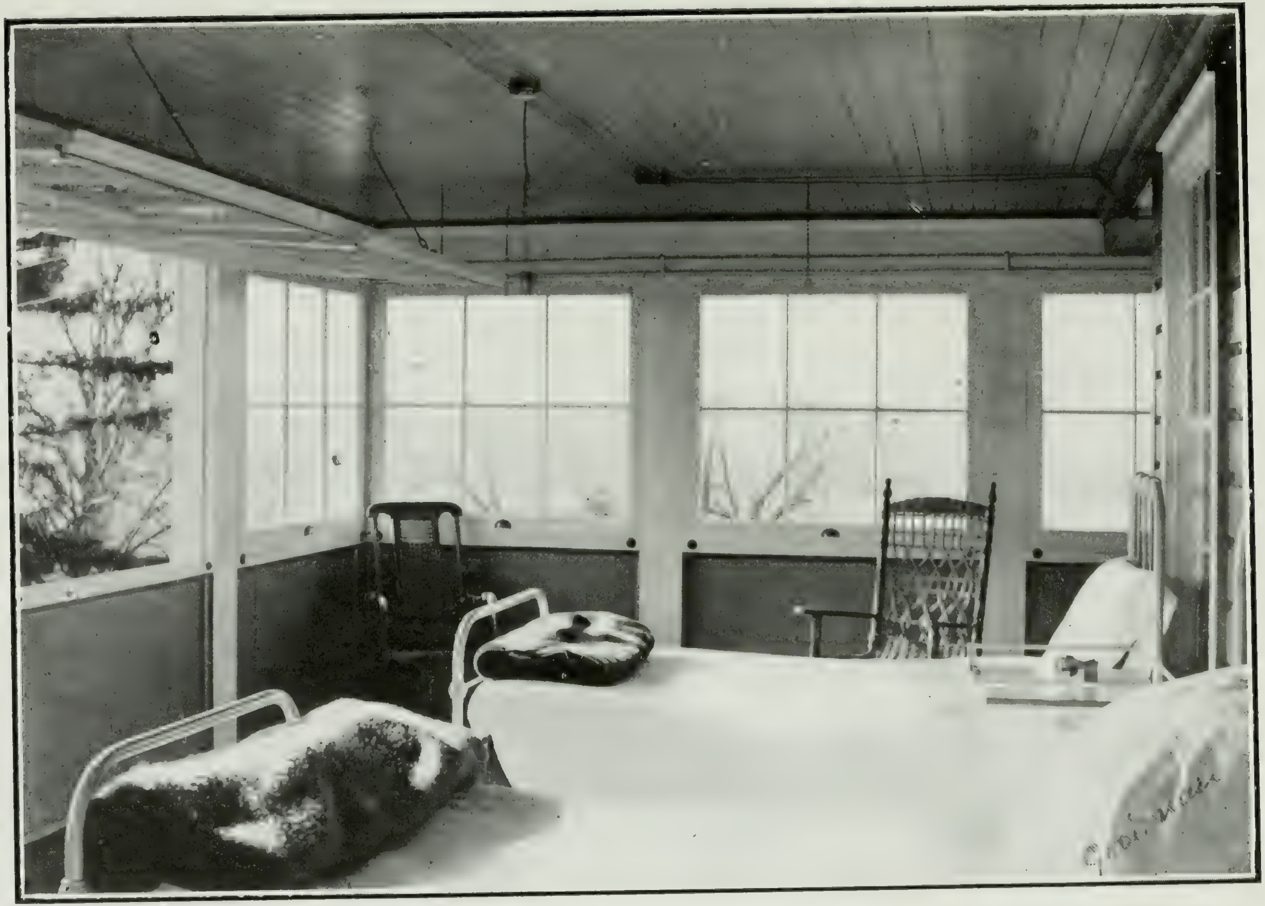
St. Catharines Sanatorium.



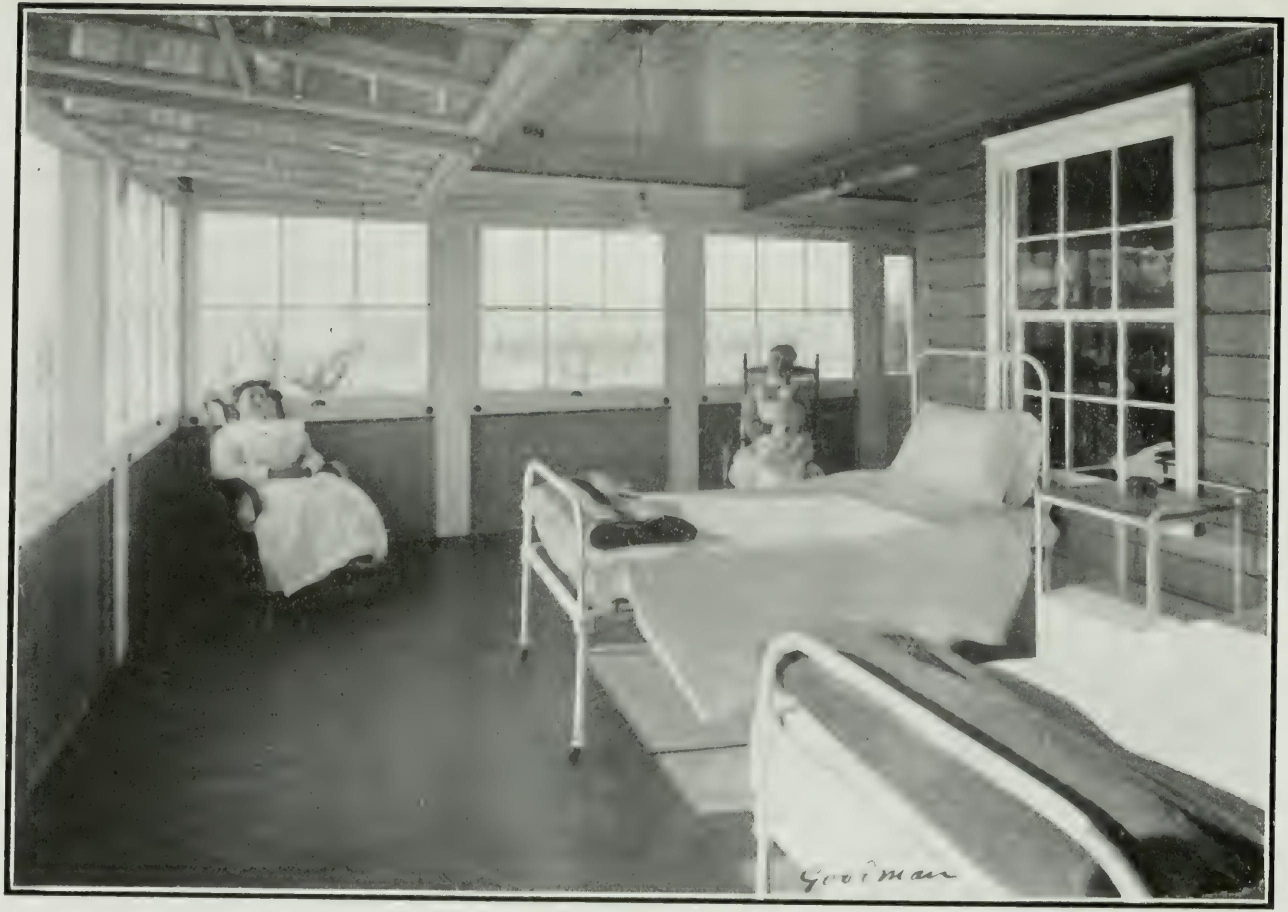
St. Catharines Sanatorium.

St. Catharines Sanatorium.

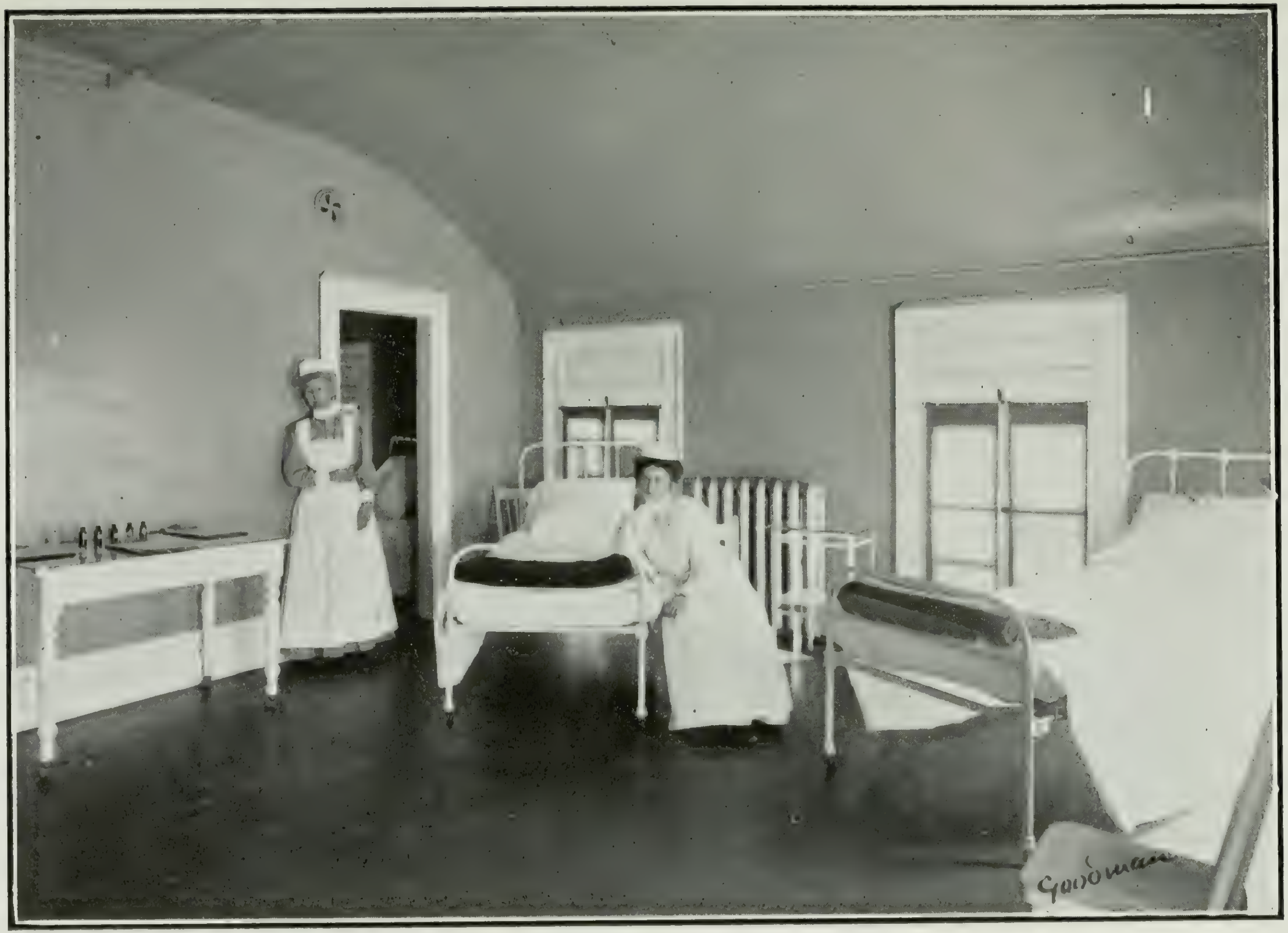
St. Catharines Sanatorium Cottage.



St. Catharines Sanatorium.



St. Catharines Sanatorium.



St. Catharines Sanatorium.

in whole or in part for their own maintenance and who may be properly recommended. These patients to be accommodated either in a pavilion to be erected or in the existing hospitals of the National Sanatorium Association.

"2nd. The Ottawa Association for the Prevention of Tuberculosis, whose object is given in its constitution, to carry out practically in the City of Ottawa the principles and aims stated in the Constitution of the Canadian Association for the Prevention of Tuberculosis, particularly in the following manner:

"(*a*) To co-operate with the Health Officer and the Board of Health in enforcing all sanitary regulations which aim at the prevention of Tuberculous infection; to promote the passing of such further regulations as may be needed to preserve the milk and other food supplies from contamination, and to seek such further regulations as to public institutions, houses and persons affected by the disease as may be found necessary to cope with it effectually.

"(*b*) To bring about such co-operation of the government, municipality, philanthropic and other organizations and individuals as shall enable the City of Ottawa to utilize all the powers given by legislation and, if necessary, to seek further legislation embodying preventive measures and providing all necessary facilities for the proper treatment of patients suffering from consumption and other forms of Tuberculosis in any form and at any stage, such provision to consist of a sanatorium together with such infirmary, hospital or other accommodation as shall be found necessary.

"(*c*) To make such arrangements with the churches, benefit societies, philanthropic and other institutions and individuals, as shall provide an annual income sufficient to supplement the grants from the government and other municipality to such an extent that all the advantages provided shall be open to the poor.

"(*d*) To co-operate with similar associations in other localities in an effort to combat the scourge of Tuberculosis throughout the Dominion of Canada.

"These two organizations entered upon their work with great earnestness; the first by the selection and transference of cases in the earlier stages for treatment at Gravenhurst and those more advanced at Weston; the second by (*a*) the appointment of a visiting nurse to visit the homes of those suffering, give instructions as to precautionary measures, distribute sputum cups and generally to advise for the comfort of the suffering and the safety of those associated with them; (*b*) urging upon the Board of Health the more thorough enforcement of the By-law against spitting on the sidewalks and in public places, and having placards respecting this placed conspicuously throughout the city; (*c*) petitioning for a better supervision of the milk and food supplies; (*d*) with the permission of the School Trustees the distribution of literature of an educative nature through the schools of the city.

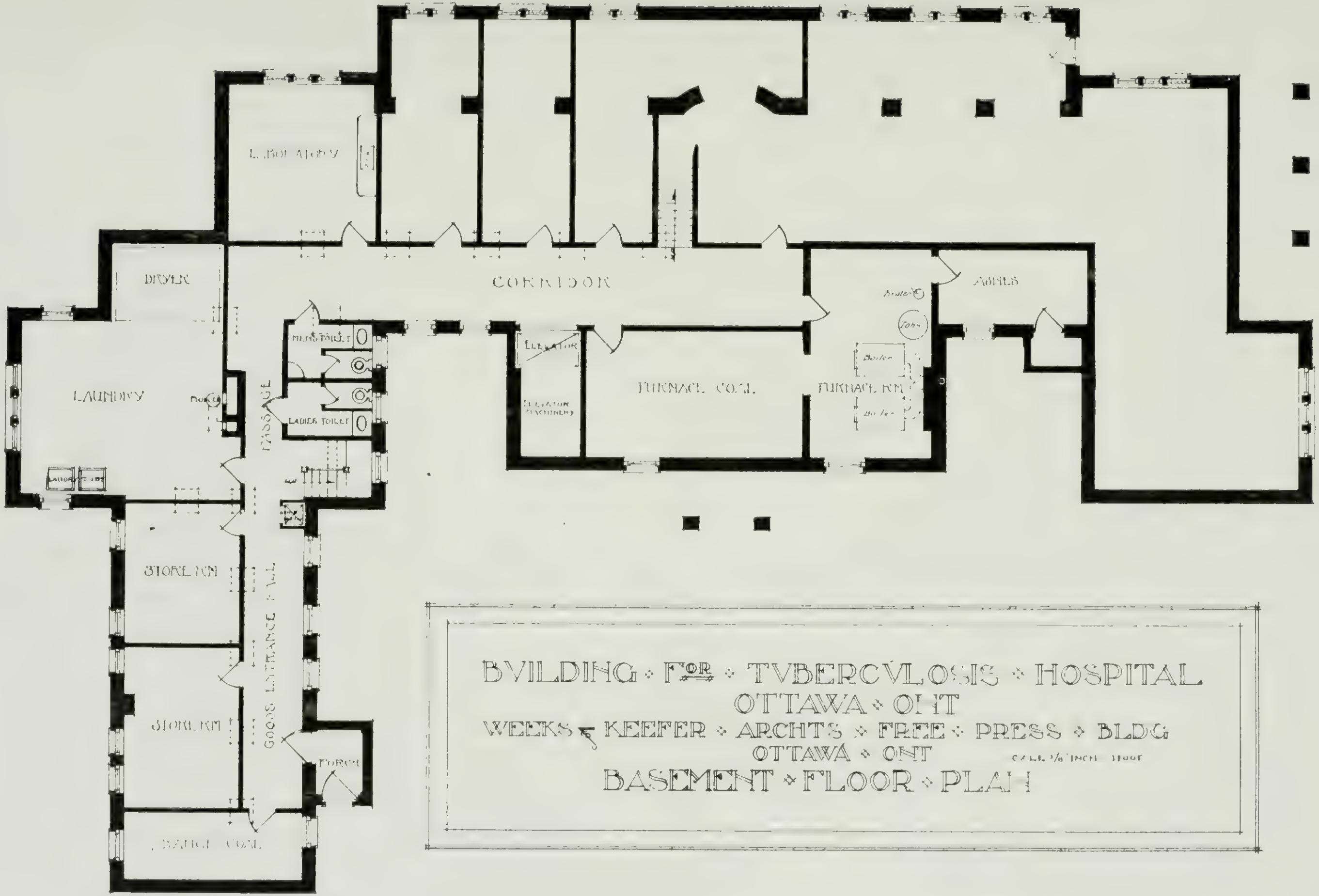
"In carrying on their work the greatest harmony prevailed between the two organizations, each turning over to the other cases which more immediately came within their province, but the existence of two organizations apparently combating the same disease was a little confusing to the public; accordingly in 1907 the two organizations came together under the name of the Ottawa Anti-Tuberculosis Association, with the happiest results. Great use has been made of the opportunity of sending cases to Gravenhurst and Weston, and in many of these with most satisfactory results to the patient, but in all with great benefit from an educative point of view to those associated with them. The appointment of a Visiting Nurse has been a great success. Caution in procedure was necessary. The step was a new one, and the entrance of a nurse into the home might have been resented as an intrusion, but in the choice of our nurses we were singularly fortunate; with tact and kindliness they made their way until now, four years after, the visit of our nurse is eagerly looked for, and no door is barred against her. The Board of Health cordially endorsed our application for a more thorough enforcement of the anti-spitting by law, and after a few convictions the streets, etc., presented a very different appearance. They also acted upon our petition for a better supervision of the milk and food supplies, providing a special inspector to test the milk and inspect the herds and stables from whence it comes, and a better qualified market inspector. As regards the milk and meat supplies, Ottawa now stands in a very good position. The privilege of putting educative literature into the hands of the school children we attach great value to. What, under other circumstances, would probably be consigned to the waste paper basket when taken home by the children, with a word from their teacher has more chance of being read and thought over.

“It will not be surprising if the work thus organized soon broadened and new requirements presented themselves. Thus, though Gravenhurst and Weston provided an open door for those who could travel, it was soon found there were many whom it would be desirable to remove from their homes, but who were too advanced in the disease to travel any distance. The local hospitals did not want them, and it was only after very earnest solicitation, the Sisters at Water Street placed two wards of three beds each at our service. For this the Association shall be very grateful. Then the need for a place where information could be received and patients examined began to grow; in other words, the need for a Dispensary. At this point the May Court Club, who had been plenteously providing milk, eggs and clothing for distribution by the nurse, came forward and offered to provide such a place and for nearly two years we have had a Dispensary, open three days a week, attended by the medical men of the city, and equipped and maintained entirely by the May Court Club, from which the greatest benefit has been derived. The accommodation provided by the Sisters of Water Street Hospital could only be of a temporary nature; besides, as the work grew, six beds were in no way sufficient for our requirements, consequently steps were taken to secure a building suitable for our needs. Obstacle after obstacle was placed in our way. Tired out with frustrated efforts the Association approached the City Council and submitted that if the City Council would find a site and maintenance for the Hospital the Association would put the building up and equip it. The suggestion was adopted, but delay after delay over a site took place until one of Ottawa's public-spirited ladies put a free site at the service of the Association. This site did not meet with the approval of the Council, but it brought a definite offer of a site from them, and on which a Hospital for 45 beds is now erected, which the city is pledged to maintain for all time, under the joint management of the City and the Association. A most delightful feature in connection with this building is the readiness with which the citizens provided the money for construction and funds for its equipment. Another interesting feature of the work is the way in which help to the needy has been provided. Through the May Court the nurse has been able to distribute eggs, milk, medicine and clothing where needed, and through the Ladies' Visiting Committee the poorer families have been cared for and relieved, some from the pinching cares of poverty and others from the wearing anxiety of arrears of rent and poorly-clad children.”

Description of Building for the Ottawa Anti-Tuberculosis Association.

Weeks & Keefer, Architects.

When it was first proposed to erect a building in Ottawa to accommodate the various tuberculosis patients, the question of type of plan was one that was discussed



BUILDING ◆ FOR ◆ TUBERCULOSIS ◆ HOSPITAL
OTTAWA ◆ ONT
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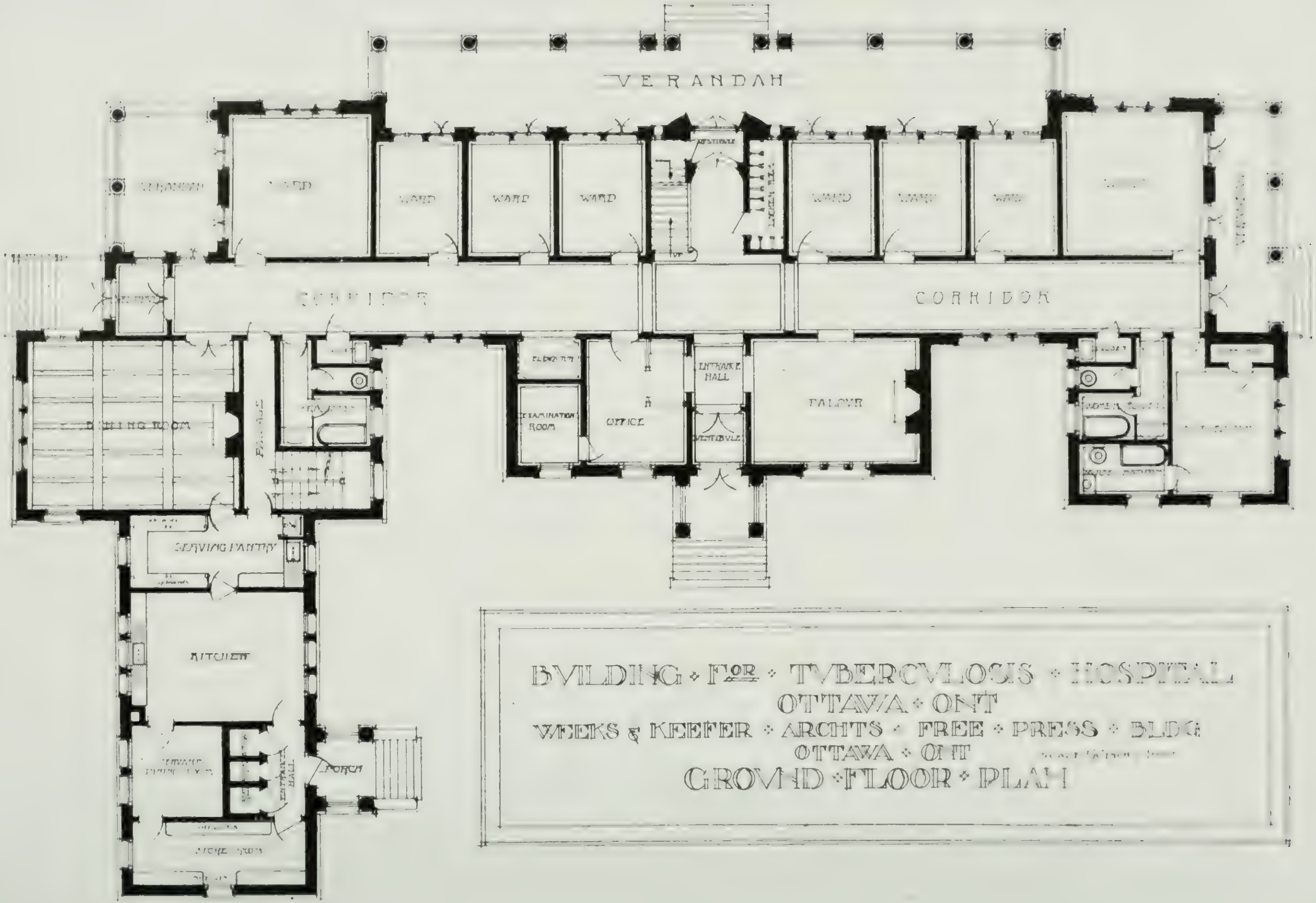
OTTAWA ◆ ONT
SCALE 1/8 INCH 1 FOOT
BASEMENT ◆ FLOOR ◆ PLAN



BUILDING • FOR • TUBERCULOSIS • HOSPITAL
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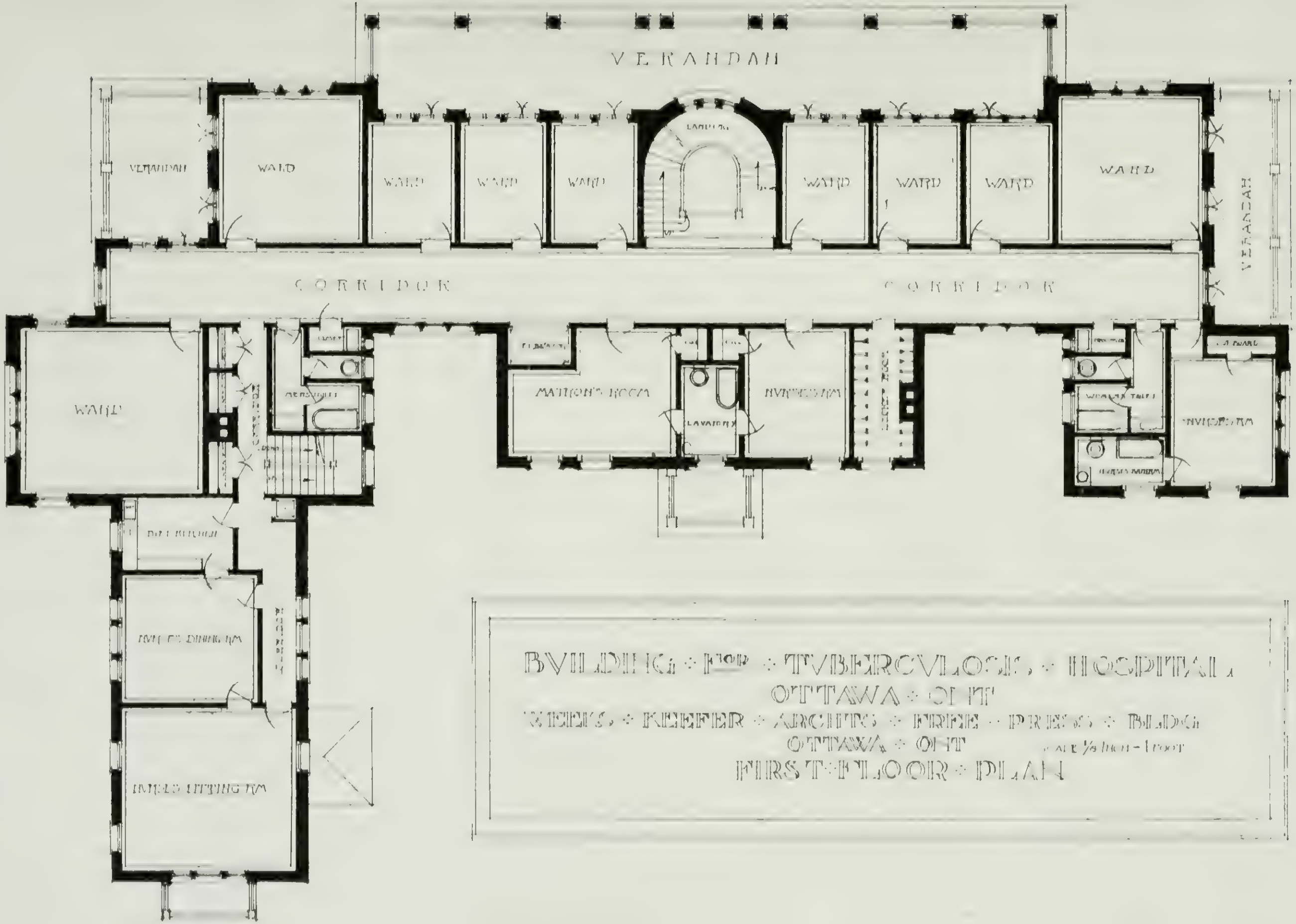

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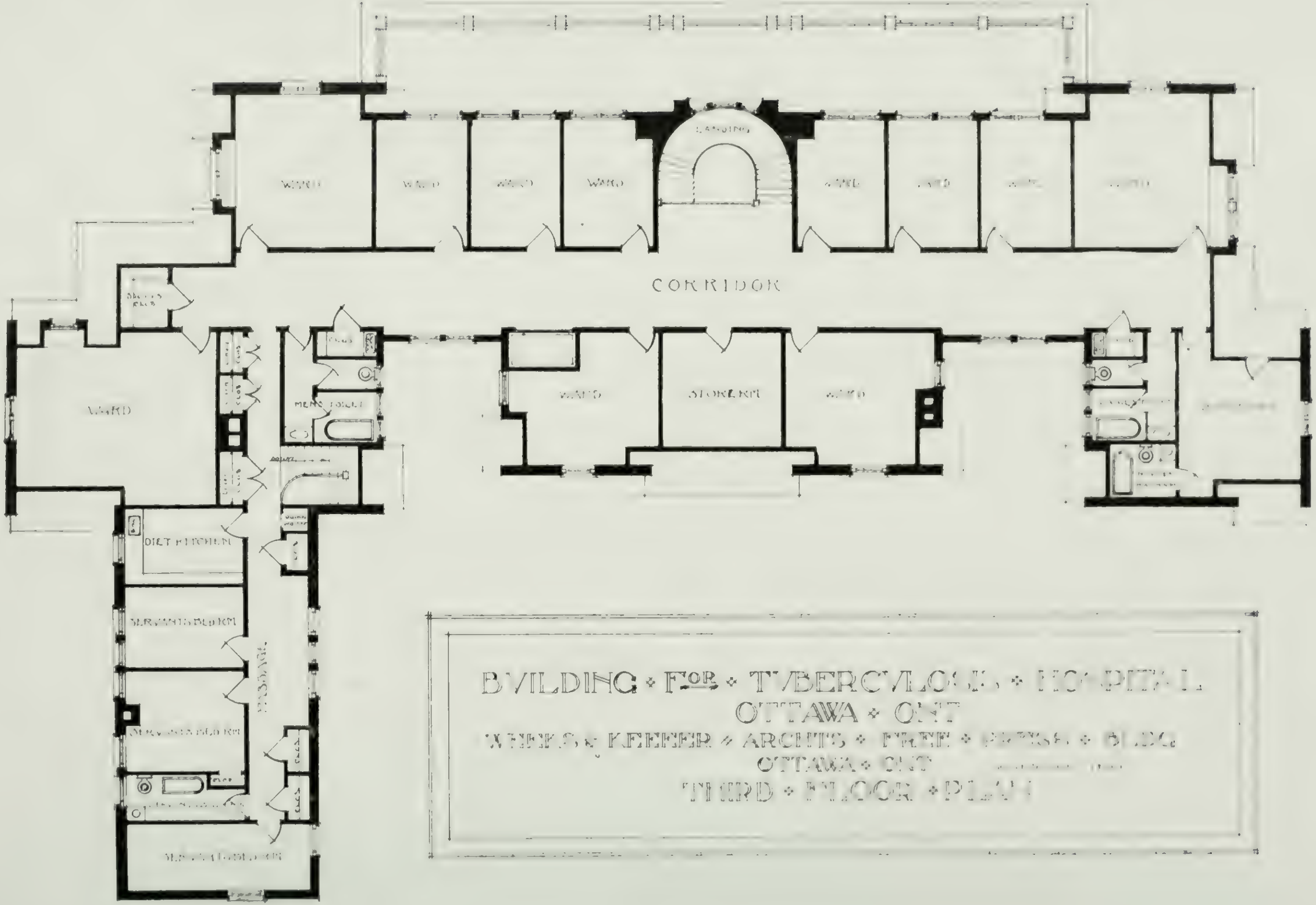

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at length, and upon consideration of the various institutions throughout the country, it was finally decided to erect a building similar in plan and requirements to the Reception Hospital at Saranac Lake, New York, which institution had been pronounced entirely successful from every standpoint, and with this idea in mind it was thought advisable to follow the Hospital rather than the Sanitarium type.

The building is placed on an excellent sloping site, facing to the south and west and screened on the north by a grove of hardwood trees, offering ample protection in winter.

The plan of building is such that all wards face the south and open onto large verandahs, so that it is possible for the patients to pass directly to verandahs from each ward, the doors and windows being so arranged that practically the whole front of building may be thrown open and perfect natural ventilation obtained.

On each floor there are six single wards, each 10 feet by 13 feet, with two large wards, 20 feet by 18 feet at ends, and on the two upper floors the rooms immediately over the dining-room will be used for the more convalescent patients, so that, in all, it will be possible to accommodate from 42 to 46 patients. The main corridor, eight feet wide, extends from end to end of building, with large windows and doors at ends and courts, insuring perfect ventilation and light.

The nurses' rooms are placed at north-west corner, giving the necessary privacy and accommodation; the resident doctor's quarters being on second floor in the centre of building. Separate living and dining rooms are also provided for nurses on the second floor in service wing, this being entirely isolated from the patients. All servants' rooms are placed on the third floor above the nurses. Ample toilet accommodation is provided on each floor at both ends of main corridor, while the resident doctor, nurses and servants will have separate baths.

The ground floor provides for office, examining room and parlour convenient to main entrance.

The main dining-room, kitchens, pantries, servants' dining-room, cold storage, etc., being placed in the north-east wing. A diet kitchen is also provided on the second and third floors, connected with dumb waiter to serving pantry on ground floor.

The basement includes laundry, large store rooms, laboratory, trunk room, boiler room and coal storage.

The building is heated by hot water.

The exterior walls of building are of a hard local red brick, laid in white mortar with Indiana limestone trimmings. The general type of architecture following closely the modern English residential type. The verandahs and all exterior finish being painted white, giving a light cheerful feeling to the whole. The building has the advantage of a very beautiful location, which enhances the architectural effect and is sufficiently removed from all other buildings to give the necessary privacy and freedom for the patients.

The building, while not fireproof, has been constructed with every care to make it as slow-burning as possible, and ample provision has been made for egress of patients should occasion demand. Owing to its location on the outskirts of the city, a separate system of septic tanks was necessary for the disposal of sewage.

A very gratifying feature has been the quick time in which the contractors have delivered the building complete, the ground being broken in July and the building finished by the end of December.

For description of the building erected the writer is indebted to Weeks & Keefer, Architects, whose plans are also produced, as they will no doubt prove of interest to other cities contemplating the erection of buildings for similar purposes.

As requests are frequently made by local associations for plans for Patients' Quarters, the accompanying illustrations and plans are submitted, together with estimated cost of the same. It, however, must be understood that the cost of erection altogether depends upon the material used, cost of labour, etc.

The first illustrations are of buildings of the lean-to type, which type lends itself to cheapness of construction besides proving very serviceable and comfortable, whether adapted for either incipient or advanced cases.

It must not be forgotten that lean-to's require some system of ventilation, the open front not being sufficient. A circulation of air is provided for in various ways, such as side windows, ceiling ventilation or windows in the porch roof.

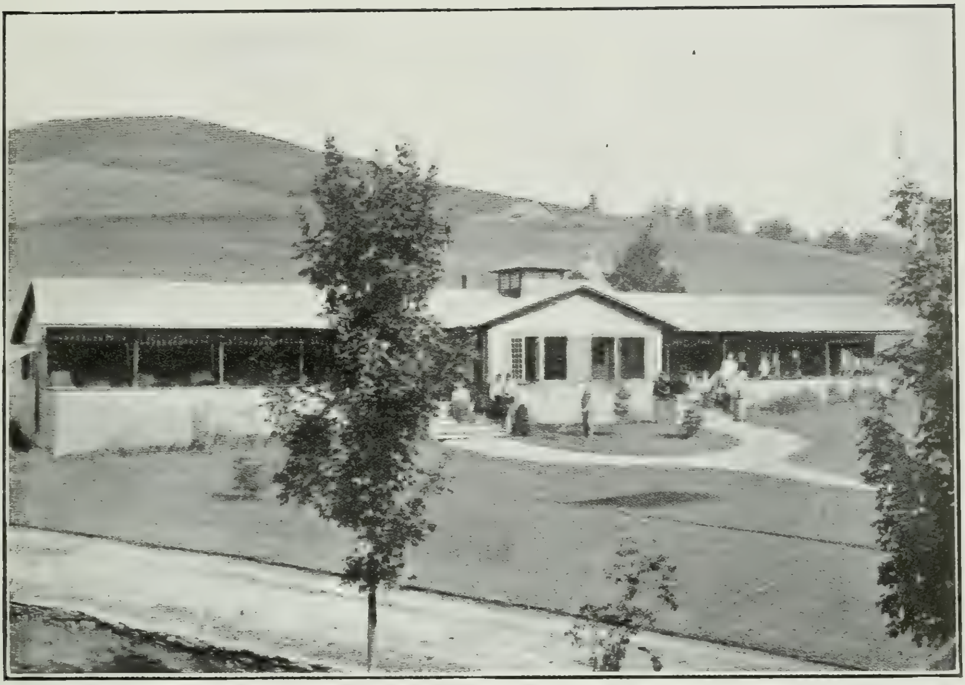
In the construction of the lean-to where plumbing is not to be installed, toilet convenience may be concentrated in a small central building.

In every case plenty of porch space should be allowed the patients.

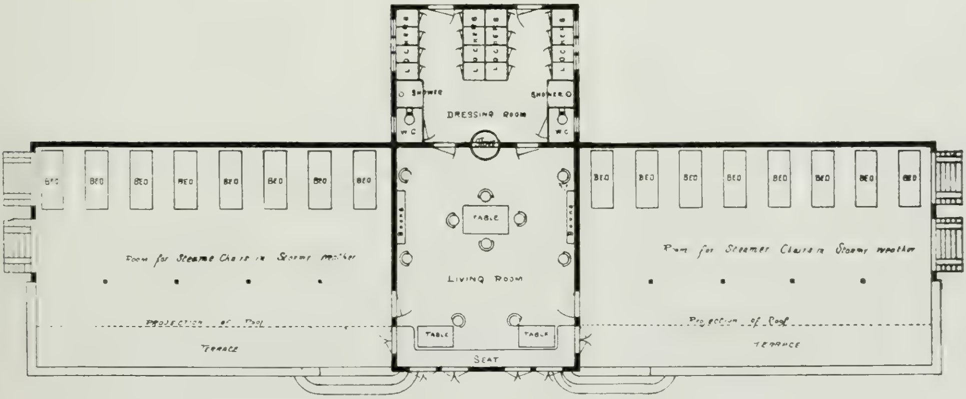
The accompanying cuts are taken from a very interesting and useful publication of the National Association for the Study and Prevention of Tuberculosis of the United States, and the various designers or architects are given due recognition for their plans, and the estimated cost in every case is that given in the publication above referred to. It must be remembered that this is a feature that must in every instance be subject to local cost of material and labourers' wages.

The second group of illustrations are of the cottage type. Where this class of building is used it meets the wants of that class of patients who are willing to pay for nursing attendance and housing. On the whole, they have been found very useful and, by many authorities, are preferred to tents.

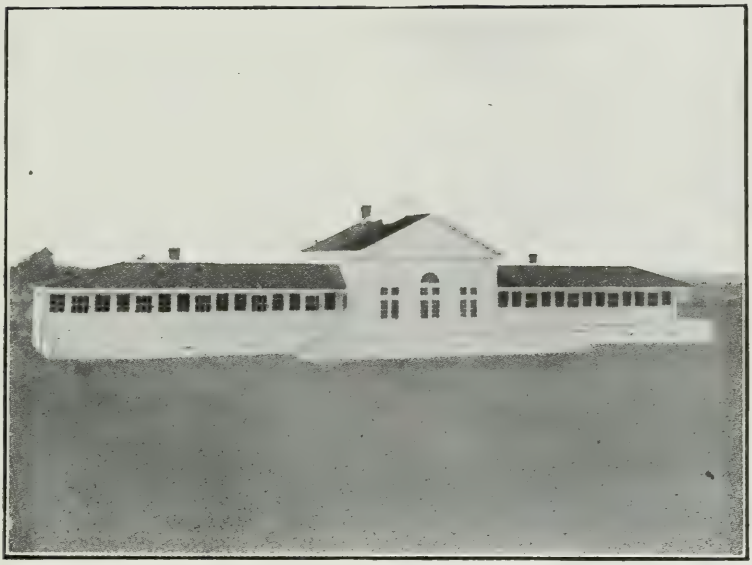
The third group consists of illustrations of two of the buildings upon the grounds of the Ohio State Sanatorium: they are of the latest and present many excellent features of construction and arrangement.



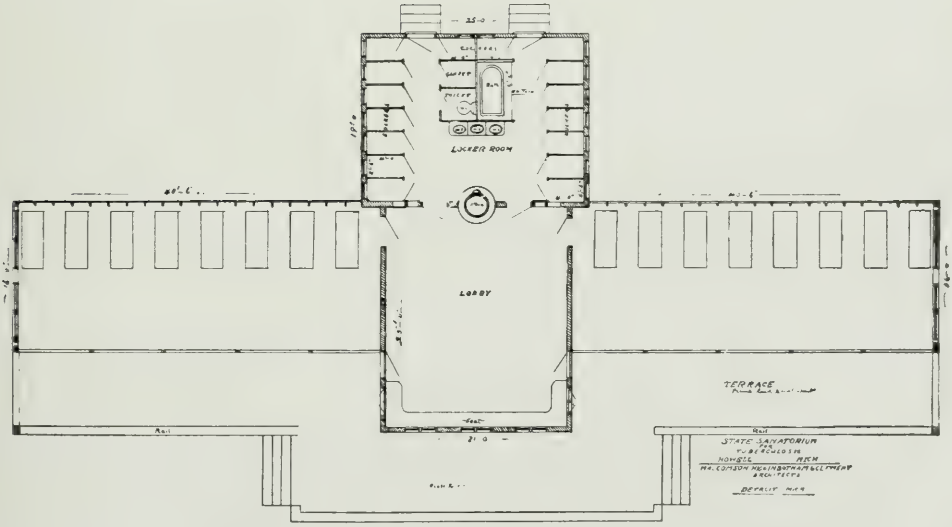
Loomis Sanatorium, New York.
Original Improved Lean-to, Designed by Dr. Herbert M. King.
Cost $1,830.



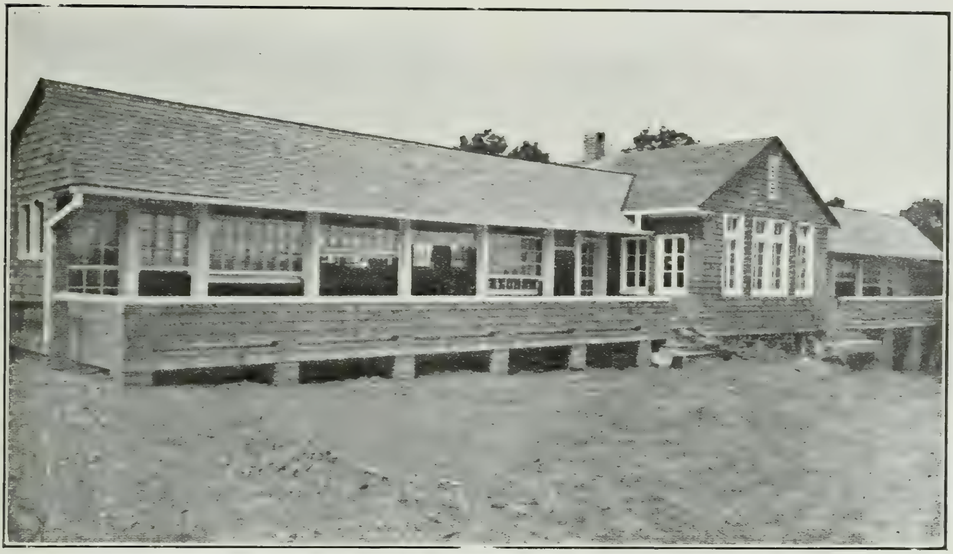
Loomis Sanatorium—Lean-to Floor Plan.



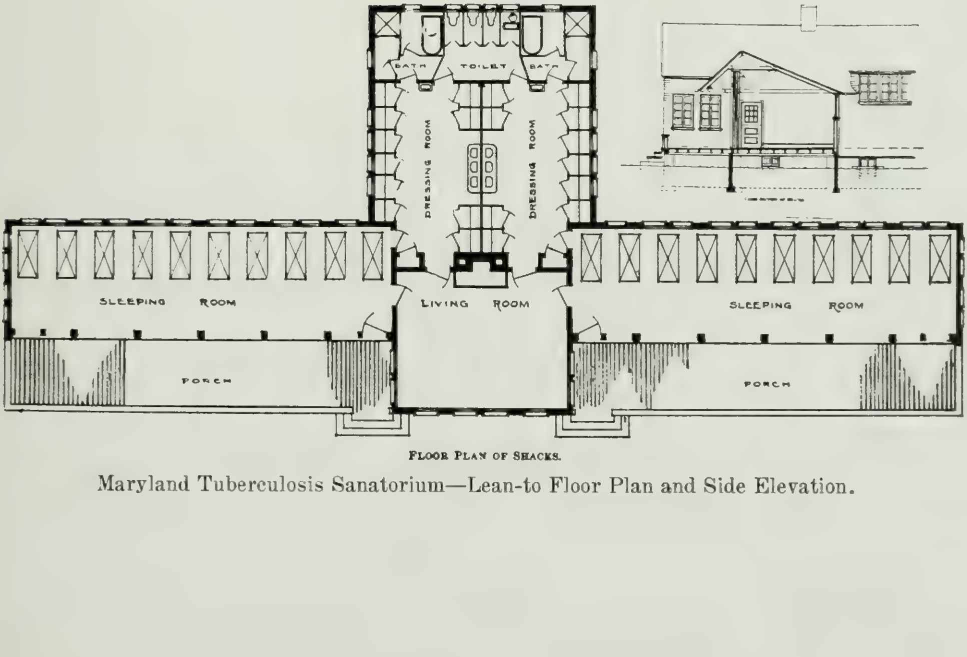
Michigan State Sanatorium—Lean-to.
Malcomson, Higginbotham & Clement, Architects.
Cost, $4,500. Capacity 16 Patients.



Michigan State Sanatorium—Lean-to Floor Plan.

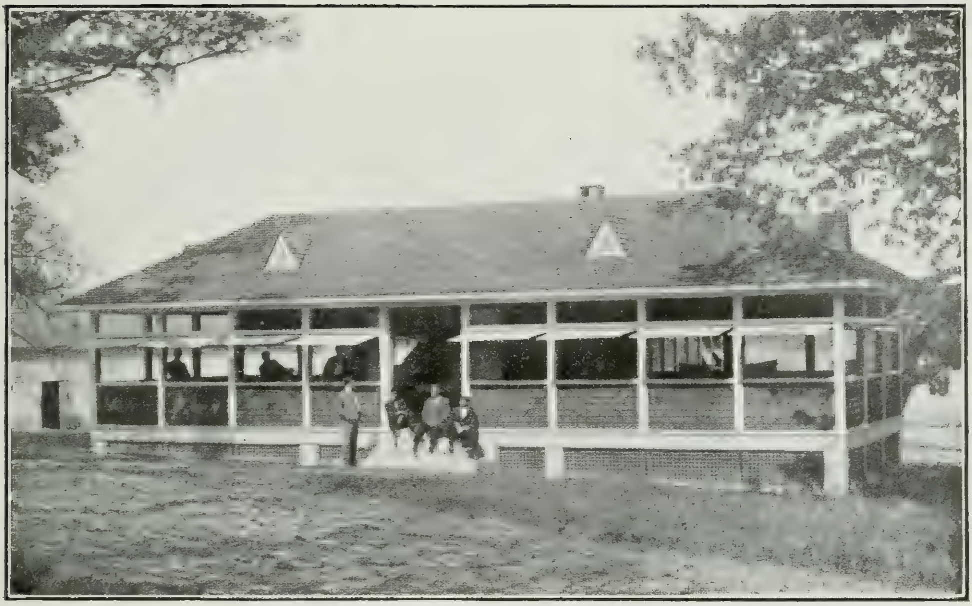


Maryland Tuberculosis Sanatorium—Lean-to for 20 patients.
Wyatt & Notting, Architects. Cost, Approximately, $7,000.

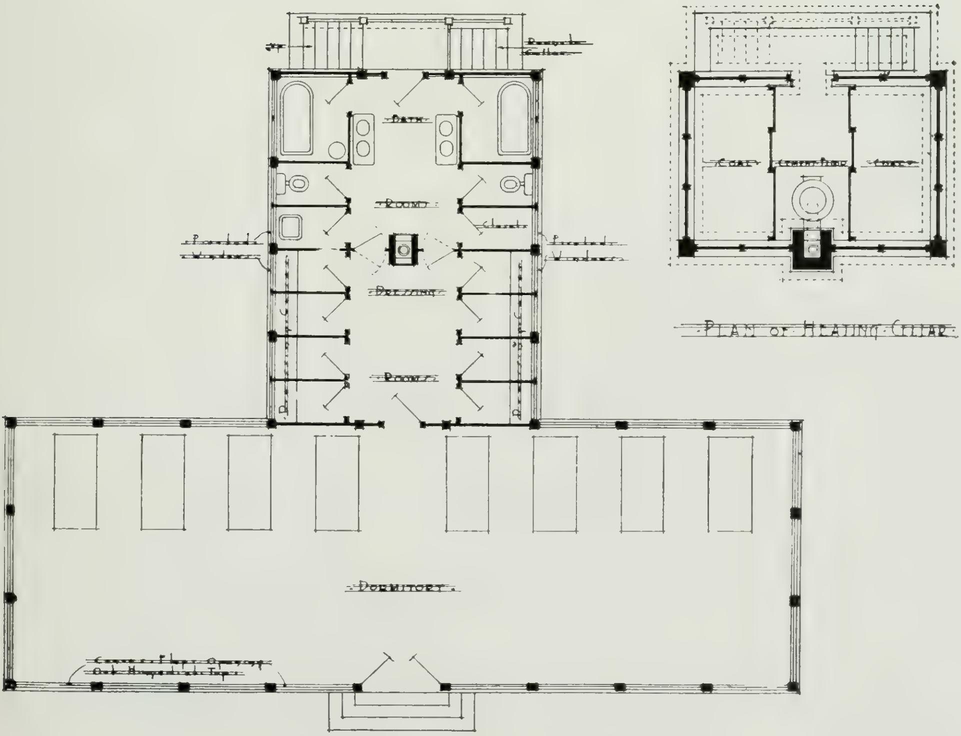


FLOOR PLAN OF SHACKS.

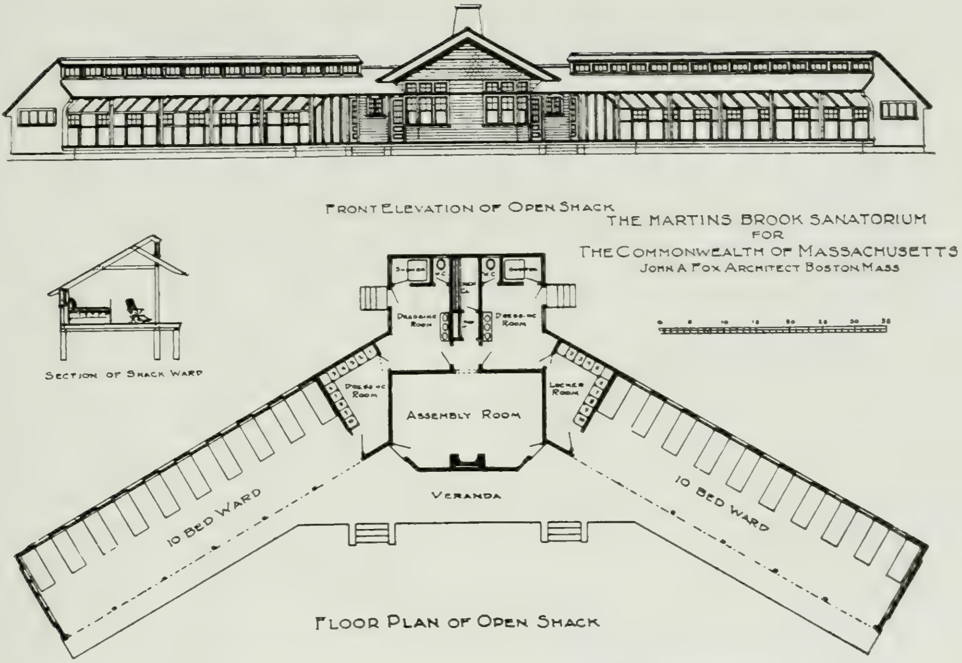
Maryland Tuberculosis Sanatorium—Lean-to Floor Plan and Side Elevation.



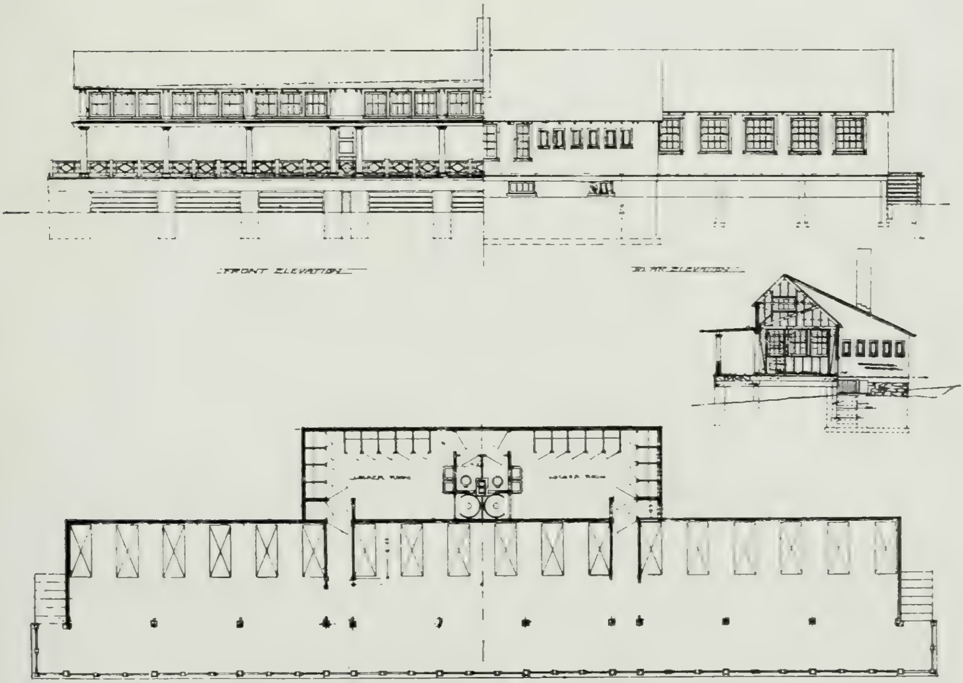
Eudowood Sanatorium, Maryland—Lean-to.
Archer & Allen, Architects.
Cost, $4,000. Capacity, 8 Patients.



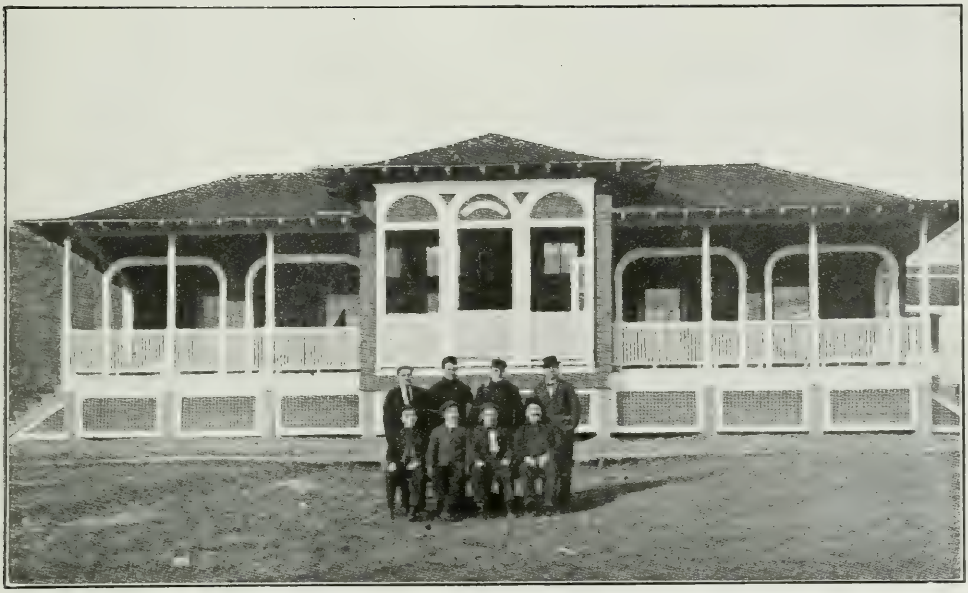
Eudowood—Lean-to, Floor Plan and Heating Cellar.



Martins Brook Sanatorium, Mass.—Lean-to for 20 Patients.
Jno. A. Fox, Architect. Cost, $3,500—$175 per Patient.

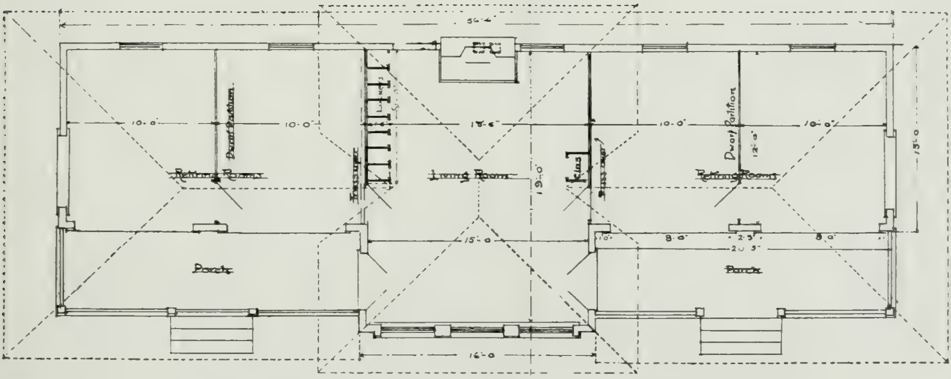


Otisville Sanatorium, New York—Lean-to for 18 Patients.
Estimated Cost, $4,400. Designs of the Department of Health ;
John V. Van Pelt, Architect.

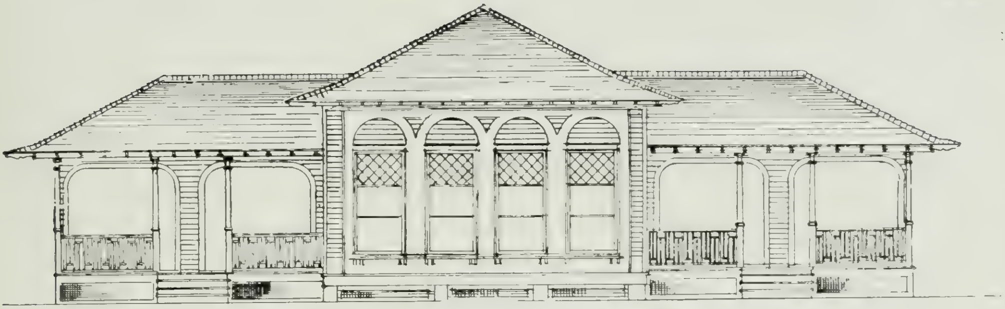


Otisville Sanatorium, New York—Cottage for Eight Patients.

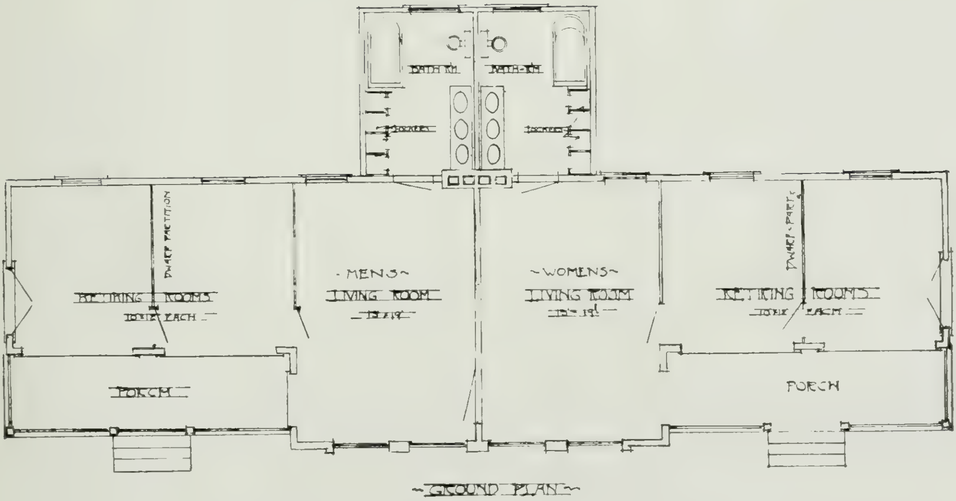
Designs of the Department of Health.



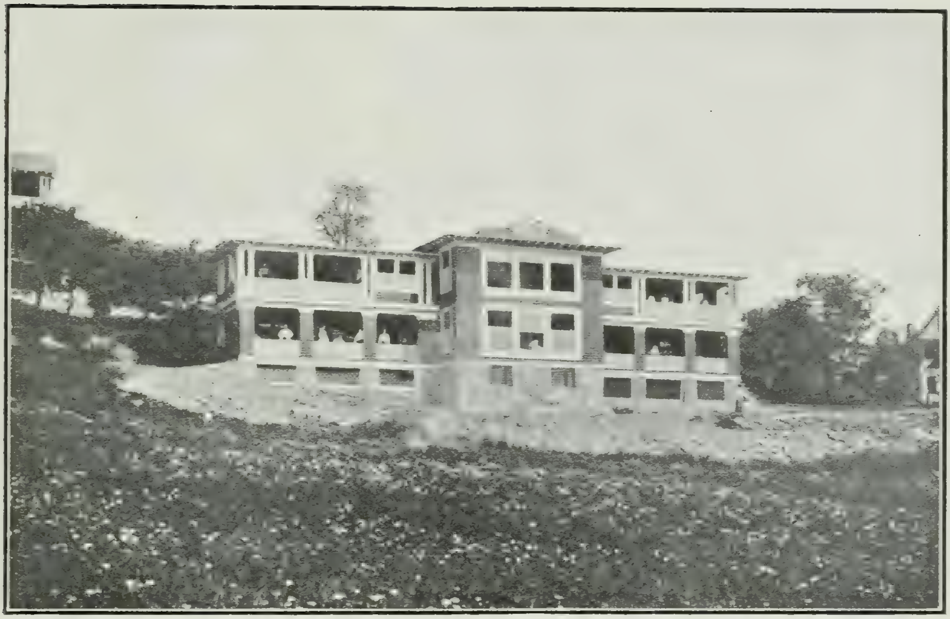
Otisville Sanatorium, New York—Cottage for 8 Patients, with partitions dividing the porches into small rooms for two persons. Cost, $1,200.



Otisville Cottage—Front Elevation of Modified Plan.



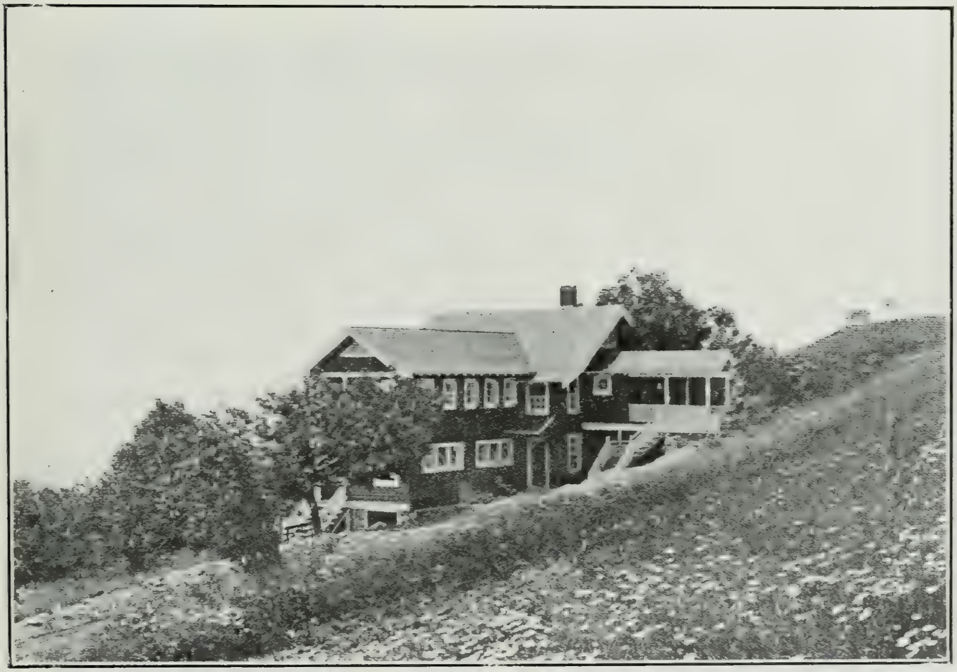
Otisville Cottage—Floor Plan of Modified Plan.



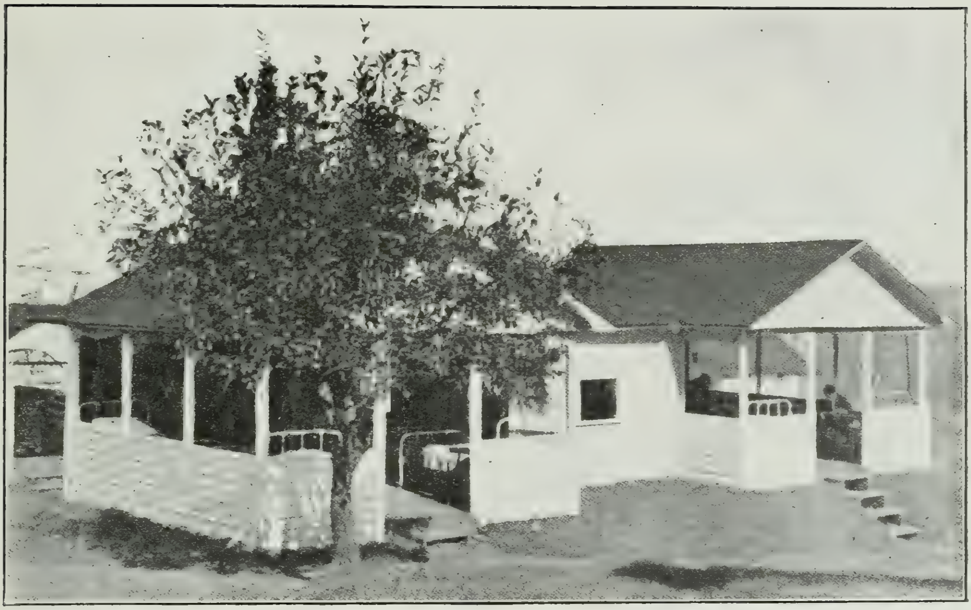
Otisville Sanatorium, New York—Women's Infirmary Building.

Estimated Cost, $5,000. For 20 Patients in Open Wards and 4 Patients in the Enclosed Room.

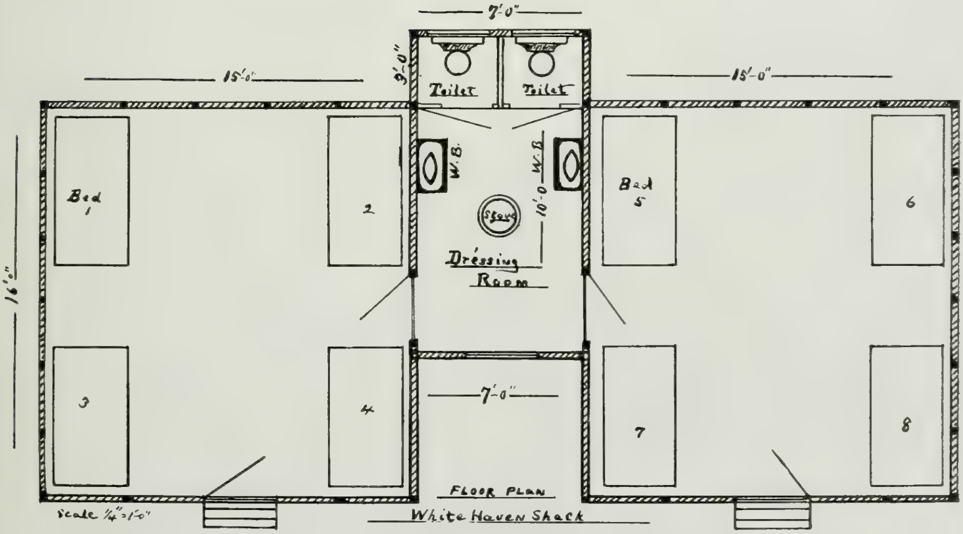
Designs of the Department of Health.



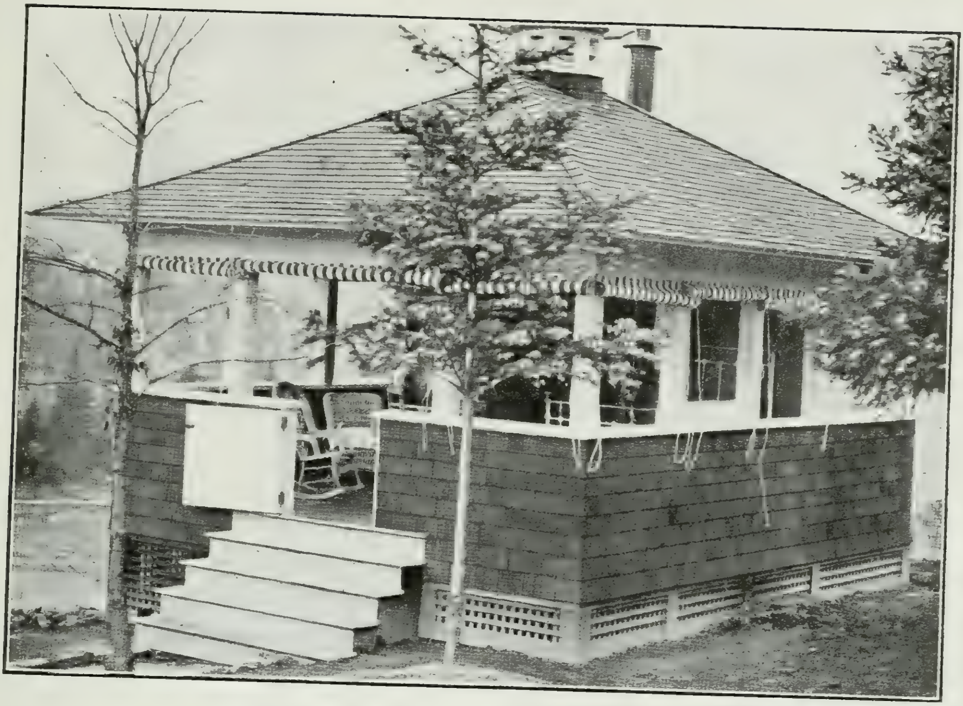
Otisville Sanatorium—Women's Infirmary Building, Rear View.



White Haven, Penn.—Sanatorium Cottage for 8 Patients.
Estimated Cost $800.

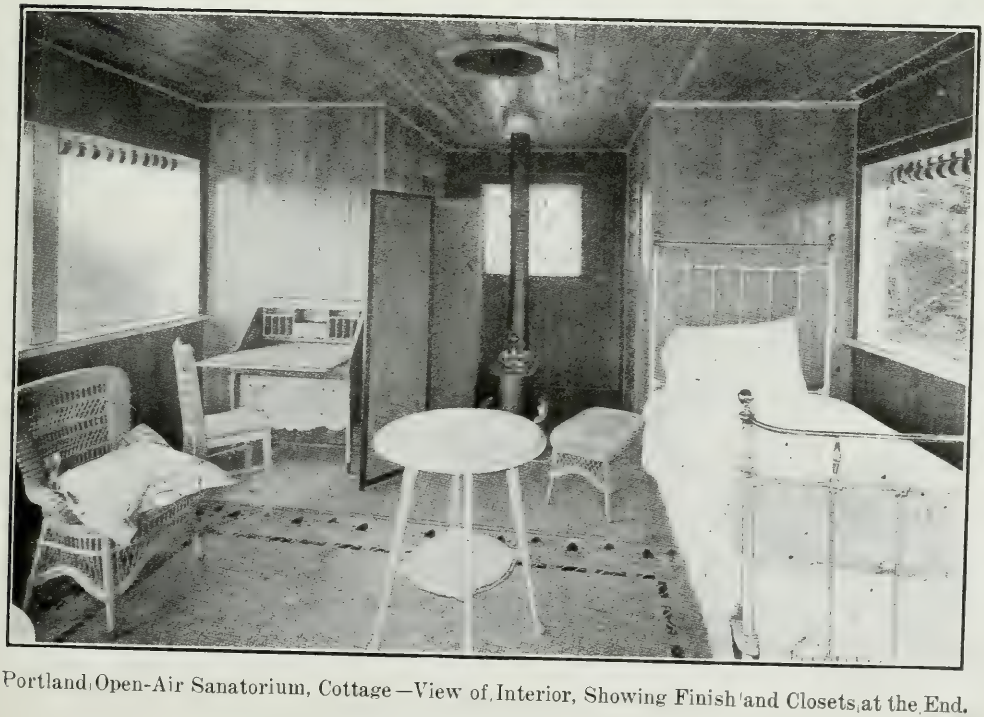


White Haven Sanatorium Cottage—Floor Plan.

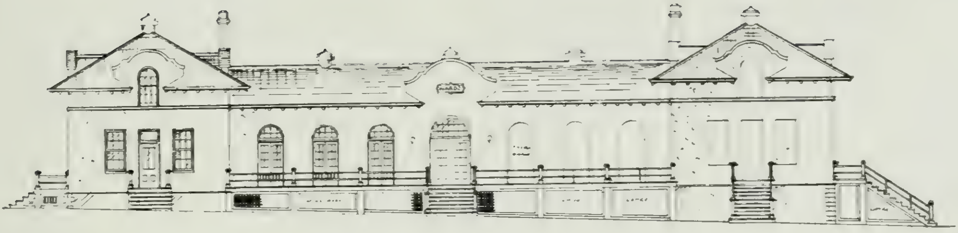


Portland, Oregon—Open-Air Sanatorium, Cottage.

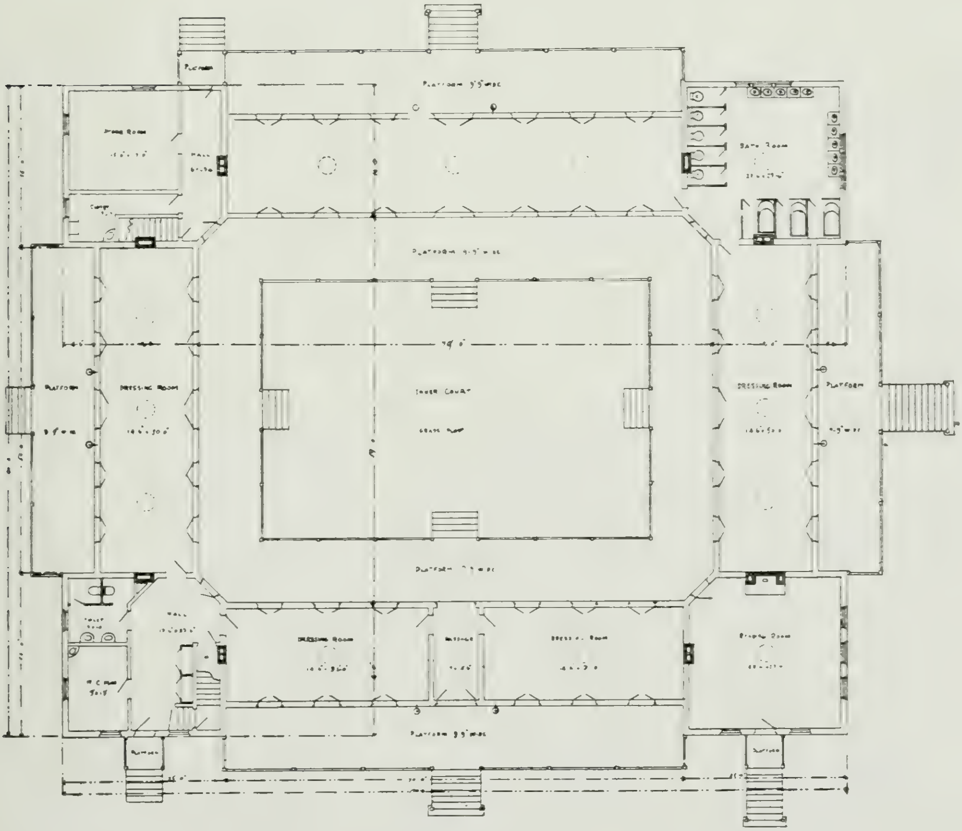
Cost. $1,000. For 1 or 2 Patients.



Portland Open-Air Sanatorium, Cottage—View of Interior, Showing Finish and Closets at the End.

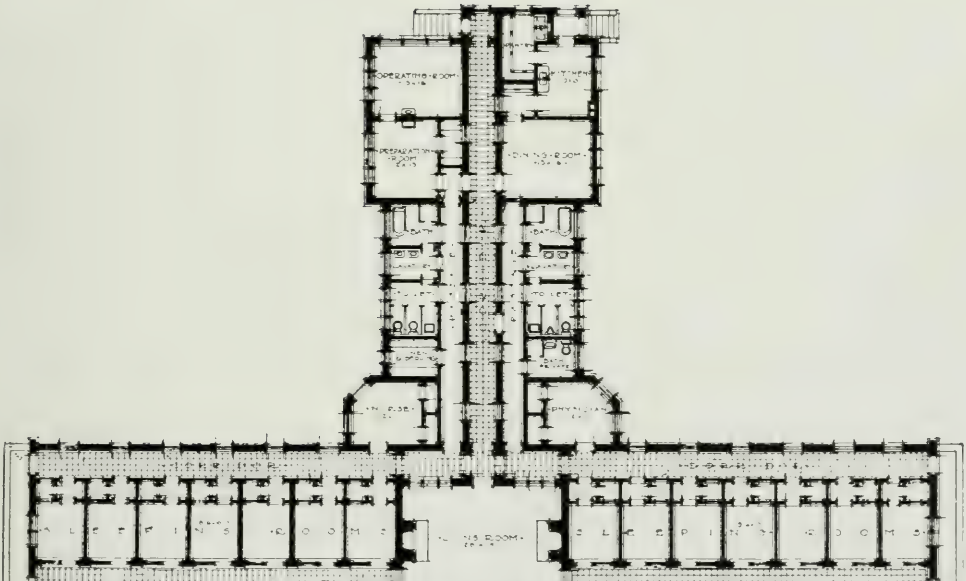


United States Hospital, Fort Bayard, N. M.—Front Elevation

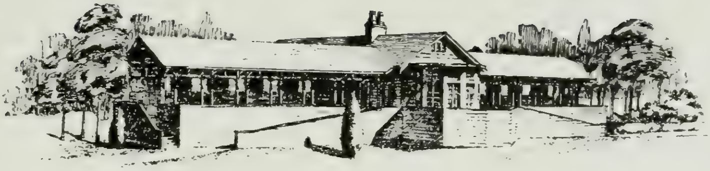


United States Hospital, Fort Bayard, N. M.—Floor Plan.

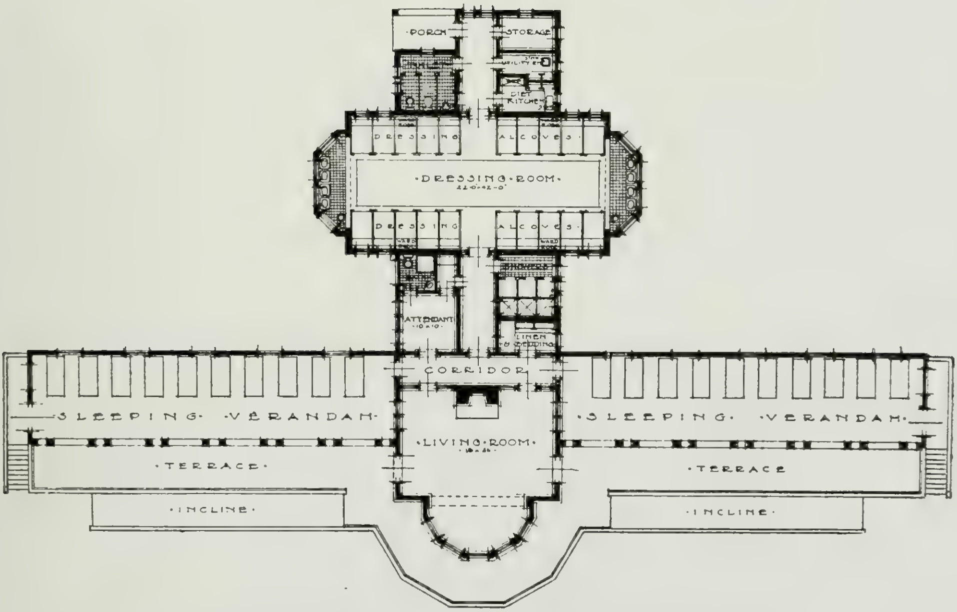
Ohio State Sanatorium—Infirmary Building.
F. L. Packard, Architect. Estimated Cost, $18,000.
14 Separate Rooms for Patients.



Ohio State Sanatorium—Infirmary Building, Floor Plan



Ohio State Sanatorium—Proposed Cottage for 20 Patients.
F. L. Packard, Architect. Estimated Cost, $6,500.



Ohio State Sanatorium—Proposed Cottage Shack, Floor Plan.

TABLE OF SMALLPOX CASES REPORTED FOR THE YEAR 1909.

(Prepared by the Secretary.)

County.	Municipality.	Cases.	County.	Municipality.	Cases.
Bruce	Chesley	7	Ontario	Whitby	12
	Brant	3		Whitby Tp.	1
	Walkerton	2		Oshawa	1
	Lindsay	2	Oxford	Zorra W.	20
	Wiarton	1		Zorra E.	12
	Eastnor	1		Missouri E.	24
Carleton	Ottawa	1		Blenheim	9
Elgin	St. Thomas	5		Oxford E.	3
	Dunwich	2		Oxford N.	4
Grey	Glenelg	10		Norwich	4
	Hanover	5		Woodstock	12
	Owen Sound	1		Norwich S.	6
	Artimesia	2		Blanford	2
Halton	Esquesing	5		Tavistock	1
Hastings	Bangor, etc.	9	Peel	Brampton	6
	Monteagle and H	2		Albion	2
	Rawdon	1		Chingacousy	1
	Madoc Tp.	10		Toronto Tp.	3
	Belleville	2		Toronto Gore	14
	Marmora	2	Perth	Easthope S.	5
	Marmora and Lake	16	Peterborough	Peterborough	45
	Limerick	2		Otonabee	1
	Sidney	9		Dummer	1
	Tudor and Cashel	5		Havelock	1
	Elzevir	15	Rainy River	Keewatin	5
Lambton	Moore	3	Renfrew	Algoma S.	30
	Brooke	2		Raglan	7
Lincoln	St. Catharines	4		Haggerty	5
	S. Grimsby	1		Sebastopol	5
	Port Dalhousie	2	Simcoe	Collingwood	4
Middlesex	London	9		Midland	7
	London Tp.	2		Tay	14
	Dorchester N.	1		Nottawasaga	2
	Strathroy	2			
	Missouri W.	10	Stormont, Dundas&Glengarry	Cornwall Tp.	2
	Adelaide	1	Thunder Bay	Port Arthur	1
	McGillvery	2	Victoria	Lindsay	1
Nipissing	Haileybury	1		Eldon	2
	Coleman	1	Waterloo	New Hamburg	8
Norfolk	Delhi	31		Hespeler	1
	Waterford	29	Welland	Crowland	1
	Simcoe	4	Wellington	Mt. Forest	2
	Townsend	12		Minto	1
	Middleton	2		Guelph	2
	Windham	9	Wentworth	Hamilton	1
	Charlotteville	12		Saltfleet	6
	Walsingham N.	2		Glenford	6
	Walsingham S.	1	York	Toronto	50
				Markham	8
Northumb'rl'nd and Durham	Colborne	4		York	10
	Port Hope	19		Scarborough	14
	Cobourg	27		West Toronto	9
	Hamilton	15		Woodbridge	26
	(a) Hope	7		Whitchurch	2
	Seymour	36		Etobicoke	1
	Caven	13		Gwillimbury E.	26
	Campbell	4		King	3
Ontario	Pickering	4		Sutton	4

Total—874 cases reported from 118 municipalities in 30 counties.

(a) One death.

Reports on Smallpox

By Dr, R. W. Bell, Medical Inspector.

(*First report, March 9th,* 1909.)

Since my last report at your December meeting smallpox has continued to run riot throughout the Province, owing largely to non-enforcement of vaccination and laxity of quarantine of exposed persons. I think, however, there have been fewer errors in diagnosis than formerly, and the actual cases are being better dealt with, although some very marked mistakes have come under my notice. Unfortunately some of our aged confreres persist in denying that the present epidemic is smallpox, because it is not of the confluent type with which they were conversant a generation ago, but still fail to diagnose it, thereby rendering our efforts more difficult in eradicating it.

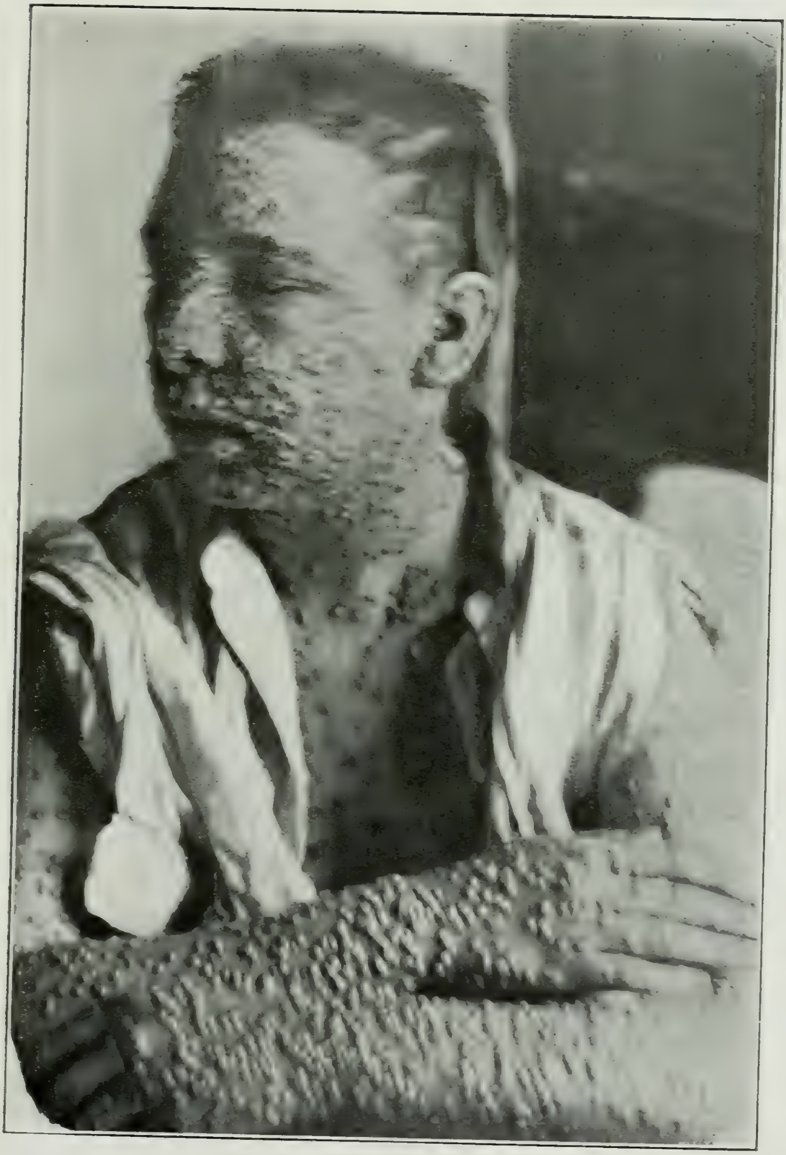
The common error of "chickenpox" and "skin disease" has been met with, but, sad to relate, one patient was seen with a profuse rash in the crust stage who had been treated for typhoid fever for sixteen days with almost normal temperature.

In the majority of places visited by me, which were only about one-third of the municipalities reporting outbreaks, I found the local health authorities were inclined to deal effectively with the disease, but in some of them considerable pressure had to be brought to bear before they would act, principally owing to expense likely to be incurred, or non-belief in correctness of diagnosis.

In the places visited the cases numbered from one to twelve or fifteen, except in the Townships of Scarborough and Markham, in York County, and Township of Limerick, in North Hastings, where these numbers were greatly exceeded. In the former municipalities vigorous efforts were made to stamp it out, and several schools and churches were closed for a time. In the latter, however, no effort was made for over three months to deal with it, the local Board of Health saying "there was no cause for alarm," although admitting some "contagious" disease "had spread all over the township." This was even after a notification from the M. H. O. that it was smallpox, but as he lived twenty or thirty miles distant he was unwilling to spend his time with it in the face of the Board's opposition.

In some municipalities no vaccination whatever was being done until after my visit: in others, proclamations ordering general vaccination had been issued, and occasionally were not enforced, but laughed at: while in others the citizens answered the call promptly.

In Port Hope, at the time of my visit, the Medical Health Officer reported of over 700 school children, all were done but 16, and in all over 1,800 vaccinations.



In Cobourg, at the end of the first week, over 2,000 had been vaccinated. The following places were visited:—

1908.	Place.	County
December 17	Town of Brampton	Peel.
" 19	Village of Colborne	Northumberland.
" 28	Township of Scarborough	York.
" 28	Township of Markham	"
" 29	Village of Markham	"
1909.		
January 5	City of St. Thomas	Elgin.
" 13	Township of Scarborough	York.
" 16	City of London	Middlesex.
" 19	Township of Sarnia	Lambton.
" 30	Village of Waterford	Norfolk.
" 30	Township of Townsend	"
1910.		
February 15, 16, 17	Township of Madoc	Hastings.
" "	Township of Tudor	"
" "	Township of Limerick	"
" 19	Township of Whitby	Ontario,
" 19	Town of Whitby	"
" 20	Town of Port Hope	Durham.
" 20	Town of Cobourg	Northumberland.

The accompanying illustration is of a well-marked case of a discrete type near Port Hope, and resulted from contact with a case diagnosed as chickenpox.

(*Second Report, December 20th,* 1909.)

Following my last report on smallpox in the month of March, the disease continued to be very prevalent in the Province for several months, but since July the falling off in reported outbreaks has been very marked. In several cases it had gained quite a foothold before being recognized: but our physicians are becoming more fully alive to the possibility of its invasion, and fewer instances occur of its being mistaken for chickenpox, etc. In the majority of cases my visits were for the purpose of confirming diagnosis, and to confer with the local Boards of Health as to the best means to be adopted to stamp out the disease. In all cases, I am pleased to say, the greatest willingness was expressed to act energetically on the advice given. The results have proved favourable. Vaccination of all exposed persons and the whole community, if possible; isolation of all infected and exposed, followed by thorough disinfection of person, clothing and premises was my motto, and, where efficiently acted on, soon saw the disease stamped out. A few confluent cases were seen, but the majority were of a mild, discrete type. Only one or two fatal cases have come to my notice. All cases were in unvaccinated persons, with a half-dozen exceptions in elderly people vaccinated from thirty to fifty years ago.

The following is a detailed list of dates and places visited, with a few remarks thereon.

March 17. Village of Odessa, County of Frontenac.—Here I visited four families and saw about a dozen patients. The M. H. O. said he was sure of two other families which had been infected. I met with the Board of Health of Township of Ernesttown, and Dr. Maybee, M. H. O., had the situation well in hand.

March 26. Township of Seymour, County Northumberland.—I spent the day driving over this township with Mr. Johnston, Chairman of the Board of Health. I visited ten families, and amongst them there had been about 30 cases. I here met Dr. Free, Acting M. H. O., who was busy visiting and vaccinating. There were two very severe cases amongst these.

April 6. Township of Cavan, County Durham.—With Dr. Turner, M. H. O., I visited four families and saw five cases. One pretty severe case here had been pronounced chickenpox by the attending physician. I had a very satisfactory meeting with the Boards of Health of the Village of Millbrook and Township of Cavan.

April 8. Village of Woodbridge, County of York.—I visited five families with Dr. McLean, M. H. O., and traced a dozen cases, some now well and not previously known, others in vesicular and pustular stages. The outbreak was well looked after, and patients were to be placed in tents.

April 21. Earlscourt, a suburb of Toronto.—Visited a case with Dr. Warren, M. H. O., it having just been discovered in the crust stage in an adult male. Dr. Warren at once took all necessary precautions.

May 17. Town of Aurora, County of York.—Dr. Stevenson having discovered a suspicious case accidentally, I visited the family, and we found three cases—a child age 2½ years, in vesicular stage; her father developing papules; and grandfather, age 79, in last of crust stage. The patients were to be immediately removed to a tent and other necessary precautions taken.

May 18. Town of Simcoe, County of Norfolk.—With Mr. Winters, of the local Board of Health, I visited five families and found seven cases. Three had just developed amongst the employees of a large dry goods store. One patient was isolated in a tent and others in their homes In the evening I met with the Board of Health, Dr. Grassette, M. H. O., and most of the town physicians, and advised as to the best method of dealing with the situation.

May 19. Village of Waterford, County of Norfolk.—Here I learned that there had been great laxity after my visit on January 29th, owing to non-belief of the M. H. O. that the prevalent disease was smallpox, and necessary precautions were neglected, until the Board of Health took action and insisted on the quarantining of all cases. Since then there had been a decided improvement. Only ten cases have been officially reported, but other physicians say they think from thirty to forty cases have occurred. The M. H. O. sneeringly said to me, "There were 140 cases, but only two were genuine smallpox, and they were confluent, the others were not smallpox," but he had quarantined all he heard of. He is a man of between eighty and ninety years of age, and does not approve of many present-day ideas.

May 22. Victoria Harbour, County of Simcoe.—I here, with Dr. Brown, M. H. O., saw several members of one family almost recovered. Later, on June 8th, I visited a quarantined family. There were then a dozen cases in isolation hospital, and disease under control.

May 23. Township of Baxter, District Muskoka.—Communications were received from Dr. Brown, Victoria Harbour, the Postmaster at Waubaushene, and the General Superintendent of Post Offices at Toronto, all reporting smallpox at Port Severn, at the mouth of the Severn River, Georgian Bay. I reached this place on Sunday, May 23rd, with Dr. Brown, who had previously seen a few of the cases, and I at once visited several families and confirmed his diagnosis. This township is unorganized, and has a sparsely-settled French population. The Township of Tay, across the river, had several cases which I saw, but being organized and Dr. Brown, M. H. O., he took charge. Baxter being unorganized, I took it in hand and proceeded with a systematic visitation of all families, quarantining wherever disease found, and vaccinating everybody I could lay hands on; but meeting next day with some violent opposition to both, and finding so many cases scattered over miles of country, I requested assistance from your Secretary. On Thursday, 27th May, Dr. Montgomery arrived, with Messrs. Johnston and Parker, two sanitary policemen from Toronto. From this time on opposition ceased. Two days later I deemed it best to establish an isolation hospital, so I telephoned J. J. Turner & Sons, of Peterborough, for tents, and received them next morning, Sunday, 30th, and had them erected at once on the bank of a branch of the river about half a mile from the main stream. We soon had several patients in, but to get complete control of all was difficult, as to reach many families we had to tramp several miles, sometimes drive four or five miles, tie the horse to a tree, then tramp over a rough trail for another mile or two through the woods, and perhaps paddle in a canoe for another mile; in other cases the only way to reach some of them was by row boat or launch several miles around some of the bays, or up the river, and tow the patients back in a skiff. Several miles up the river two cases were found in a small lumber camp just in time to prevent it breaking up. I visited Mr. Pratt, of Midland, one of the owners of the camp, and had him take action at once, but owing to carelessness at this camp at a later period the disease was allowed to spread, and prolonged the occupancy of our hospital several weeks. An effective quarantine was difficult to maintain, owing to the locations of the infected families scattered over many miles of country, and the habit of these people visiting each other on Sundays. As many of them visited Midland, Victoria Harbour or Waubaushene by boats to purchase supplies, these places established quarantine against this township. Others who came to Port Severn for supplies we controlled. Our sanitary police looked well after the wants of all who were quarantined. After remaining here eighteen days I returned home on June 8th, leaving Dr. Montgomery in charge. We had then nineteen patients in the tent hospital, and several others isolated at home. Two hundred and ninety-two persons had been vaccinated, and there were still forty or fifty more to be done as soon as they could be rounded up. On July 13th and 14th I again visited this place, and found five patients still in hospital (all from one household), which would have been closed by July 1st had it not been for the carelessness above spoken of at the lumber camp. The hospital was not finally closed until 5th or 6th August. In all fifty cases were rounded up here, mostly of a mild, discrete type, although a few were well covered with rash, and one case was most confluent. None proved fatal. About 340 persons were vaccinated, practically every resident of the township who had not the disease, leaving no more fuel, and the disease burned itself out. The stamping out of this outbreak involved considerable expense for physician, police, hospital tents, equipment and maintenance, etc. Dr. Montgomery reports only three of the quarantined families unable to pay for their own supplies. All were warned that they were themselves responsible for whatever they ordered, as also the store-keeper at Port Severn, although our policemen acted as messengers and carriers for them.

May 25. Town of Midland, County of Simcoe.—By request I visited Midland on May 25th, and found two cases of smallpox had been discovered in one of the hotels two days previously. Both cases had been removed to isolation tents, and the hotel was quarantined with twenty-nine exposed inmates. All were vaccinated on discovery of the disease except two, who refused. These, however, on my request consented, and satisfactory arrangements were made for continuance of the quarantine. Dr. Clark, M. H. O., and Mayor Leatherby were most assiduous in dealing with this unfortunate outbreak.

June 9. City of Peterborough.—A sudden call to Peterborough this evening brought me into conference with the Board of Health, and also the Board of Education of the city, *re* cases just discovered, and from whose homes children were attending one of the public schools. Next day, with Dr. McPherson, M. H. O., I visited one of the schools and arranged for vaccination of the pupils, then visited several of the infected families. Isolation tents were at once erected and all patients removed thereto, but before the disease was stamped out over forty cases were under treatment and spread over two months' time. Dr. McPherson proved himself a most efficient M. H. O., and I am pleased to note that the city last week generously recognized his services by an extra payment to him of $800.00 in addition to his annual salary of $500.00.

June 17. Toronto.—To-day, with Dr. Hodgetts and Dr. Kelly, of the Isolation Hospital, I visited a patient on Bartlett Ave. over whom there had been a difference in regard to diagnosis. The case was undoubtedly smallpox, and arrangements for his removal to hospital were at once made.

June 17. Thunder Bay District.—A telegram from Mr. O'Brien, police magistrate for Thunder Bay District at Fort William, hastened my departure the same night for that point *re* a reported case of smallpox brought in off the G. T. P. or National Transcontinental Railway from unorganized territory. I reached Fort William at midnight of 18th, and next day, with Mr. O'Brien, visited the patient, who was isolated in a box car, five miles out on a siding in the woods, with Dr. Wodehouse and a nurse in an adjoining car in charge of him. The patient, a Galician unable to speak English, had been picked up three days before in a hut beside the track, 160 miles distant, and brought down, to the great consternation of the authorities in Fort William, who had the car side-tracked as mentioned, with a physician and nurse and several weeks' provisions sent out to them. The patient was suffering from starvation and bronchitis more than smallpox, as he only had five spots of rash altogether, and these well advanced in the crust stage. Through an interpreter we learned that he had worked in a railway construction camp during May, and being dissatisfied, he, with others, had left about 1st June to walk along the right of way or track for over 200 miles. Taken ill two days later, he had been deserted by his companions, and had been wandering in the wilderness for two weeks with scarcely any food before found. We kept him nine days, and then discharged him recovered from his bronchitis and smallpox, and greatly strengthened from ample food. This man had a good vaccine mark from vaccination several years ago in his native country. Here a very unnecessary bill of expense had been contracted by the local authorities before my arrival for hospital equipment and provisions, etc., anticipating several weeks' isolation with the patient.

November 30. Townships of East Nissouri and West Zorra, County of Oxford.—An urgent call to visit these townships was responded to on November 30th ult., and with Dr. Murray, of Lakeside, M. H. O. of East Nissouri, I visited several families and confirmed his diagnosis; then with Dr. McDougall, of Harrington,

M. H. O. for West Zorra, I visited several families in the township, confirming also his diagnosis of smallpox. There were about thirty cases in these townships. In the evening I met the local Board of Health of West Zorra at Youngsville, and had a most interesting conference with them regarding the situation and best course to pursue. My visit was apparently appreciated.

December 1. East Nissouri.—At Lakeside this forenoon I met the local Board of Health of East Nissouri, with Dr. Murray, M. H. O., and advised *re* necessary action to stamp out the disease. Both Dr. McDougall and Dr. Murray had a good grasp of the situation, and with the assistance of their Boards of Health I have no doubt the disease will soon be under control.

Mild outbreaks have been reported recently from several other points, but owing to engagements with other duties I have been unable to visit them.

(*Third Report, December* 31*st,* 1909.)

As instructed by you last week, I have enquired into the complaint made regarding the "dumping" of a smallpox case into St. Thomas by the Village of Dutton. I visited both these towns on Tuesday, 28th inst., and find the complaint substantially correct. At St. Thomas I found the patient in the isolation hospital, suffering from semi-confluent smallpox in crust stage.

He states he considers Dutton his home, as he formerly resided there and his sister lives there, although he had been in Woodstock for nine years, until last May, as clerk in a dry goods store, when he went to Winnipeg for two months and then to Calgary for five. Here he went into the hospital for alcoholism for thirteen days, and being discharged on night of 8th inst., took train during the night for Dutton, via Chicago. On the train he was ill from headache, nausea, loss of appetite, and pain in back. On Sunday morning, 12th, in Chicago he first noticed some rash appearing on face, etc. Reaching Detroit the same afternoon, he immediately went to a Turkish bath sanitarium and had a bath and salt rub, and remained there overnight. On Monday he crossed to Windsor and took M. C. Railway train about 4 p.m. for Dutton, where he arrived about 8 p.m. and immediately went to his sister's house, but advised that none of the family shake hands with him, as the rash was now well out and he feared it might perhaps be something "catching." He says he did not consult any doctor in Detroit or Windsor regarding the rash. Next evening (Tuesday, 14th) he went down town about seven o'clock to Dr. Alex. McKillop's office, and Dr. McKillop at once pronounced the case smallpox, this being confirmed by Dr. Ling, who was in with Dr. McKillop. Dr. Ling, who is Reeve of Dutton and a member of the Board of Health, gave no advice, but hurriedly left. Dr. McKillop advised the patient not to go back to his sister's house, but to go to the M. C. R. and take train for St. Thomas, where they had a hospital and he would be properly looked after; meantime, not to go into the station, where the agent or others might see him and recognize the trouble, but to stay outside in the dark until he could board the train in about an hour. These instructions he carried out, and got to St. Thomas about 9 p.m., reporting to Dr. Marlatt, who referred him to Dr. D. A. McKillop, acting M. H. O., and the same night he was sent to the isolation hospital, where he is attended daily by the M. H. O. (who took me to see him) and a trained nurse and other attendant, at heavy expense to the city. It had been rumoured in Dutton that Dr. Drake, of Windsor, had pronounced the case smallpox and had hastened his departure. This the patient denied.

Visiting Dutton the same day, Dr. Cameron, M. H. O., told me he first heard of the case the following day about 11 a.m., when Dr. Ling told him of it, and in the afternoon Dr. Alex. McKillop reported it. Meantime the sister's family were quarantined and vaccinated, as also a brother-in-law's family who were more or less exposed before the house was disinfected. I saw his sister and she confirmed the above as far as the visit to her house was concerned, and added that on enquiry as to why her brother had not consulted a physician in Windsor, he stated: "He had seen Dr. Drake, who said the rash was result of 'Medicine given him for alcoholism.'" I may here state this answer was not true, but given to satisfy her.

I next saw Dr. Ling, and his statement agrees with that of the patient about seeing him in Dr. McKillop's office. Dr. Ling, however, repudiates all responsibility for the patient going out of Dutton (notwithstanding he is Reeve and a member of the Board of Health), as the patient was not his, and he says: "I gave no advice as to what to do with him, but got out as quick as I could, leaving him as I found him."

Later I interviewed Dr. McKillop, and his version of the patient's visit is as above told. He admitted he knew the man and that he was staying at his sister's. Regarding the advice given to get out of town and go to St. Thomas, he says: "I do not know what I told him to do; perhaps I did advise him to go to St. Thomas, but I do not remember. I do know I told him there was an isolation hospital there. He did not go back to his sister's—I suppose that was the proper place to send him until other provision could be made for him, but I did not know what to do with him, and I suppose we were to blame."

Both Dr. Ling and Dr. McKillop admitted they thought Dutton should bear at least a portion of the expense of the case incurred by St. Thomas.

The next day I visited Windsor, and there saw Dr. Drake, whose name had been mentioned as having diagnosed smallpox, and again bromism, in this patient. The statement is clearly a fabrication. I found him a highly respected and aged practitioner, 78 years old, almost absolutely blind and confined to bed, out of which he had not been for over a month, and not a patient of any kind had seen him in that time.

Dr. Ashbaugh, M. H. O., told me he had heard of the case indirectly from St. Thomas a couple of days after, and he had visited the Herendeen Hotel, where the man had a room for a few hours, and had disinfected it. He at once telephoned the Detroit medical authorities my information about the Turkish bath, so they could look out for developments.

The action at Dutton in sending the patient to St. Thomas was admittedly wrong, and doubly so in advising him to conceal his appearance and travel in a passenger train amongst those ignorant of his condition.

Report on Diphtheria

By Dr. R. W. Bell, Medical Inspector.

Dwight.—On Friday, July 30th, a telephone message from Dr. McRuer, of Huntsville, from Dwight, on Lake of Bays, in the unorganized Township of Franklin, reported diphtheria in the Gouldie House, a large summer hotel. Two hours later I was on my way to that point. At Huntsville I met Dr. McRuer, who informed me that while driving past Dwight in the forenoon he had been called in and found a child seven years of age, daughter of the proprietor, seriously ill with typical diphtheria, characterised by much membrane and offensive odour, etc. The child died at 2 p.m. and, without unnecessary delay, was buried at 5 p.m. As there had been much exposure, he had placed the premises and all inmates under quarantine. We drove out the same evening, and at 10.30 o'clock I found much excitement and indignation at being quarantined, and urgent requests to permit everyone to leave and go home, which, of course, I declined. There were thirty-seven guests, including children, with nine of family and help on the premises. Three days previously the child had been taken ill with sore throat, etc., and was confined to bed in a ground floor room opening on to a verandah and lawn where the guests congregated, and as the child was a favourite almost everyone was frequently in to see her, or at least at the open window, while her mother and sister, closely in attendance, were going all over the house making beds, etc. Swabs and gargles of Pot. Chlor. were, I was assured, freely and diligently used until the previous evening, when a physician was called in, and he, suspecting diphtheria, injected antitoxin into the patient, also her mother and sister, and procuring a swab (probably from a recently cleansed throat), sent it to your Bacteriologist for examination. Next day Dr. McRuer was called in while passing, with what result you already know

The following day a message was received reporting the examined swab negative, and I was again besieged to raise quarantine, but refused, as the indications that the case had been one of diphtheria were too clear to be ignored.

I may here state that twelve days previously a lady with two children and a nurse arrived from Toronto. One child was then ill, and the following day developed sore throat. He was freely treated with listerine, etc., for three days; then a physician called, and diphtheria evidently being suspected, antitoxin was administered to him and to some other children exposed. The child and nurse were isolated in an upper room. A swab from the frequently cleansed throat was taken and sent here for examination. Three days later a negative result was reported, and the attending physician telephoned to release the child and nurse from quarantine. They then mingled again with the rest of the household, but fortunately all were living mostly in the open air and sleeping in rooms with open windows and well ventilated.

Six days later the second case occurred. I learned that these two children were particularly intimate, blowing bubbles frequently, and using the same pipe for that purpose, adding much to the danger.

I gave immunizing injections of antitoxin to most of those exposed (several had previously had them from the other physicians), and relaxed the quarantine to the extent of allowing the guests out of the premises to the lake shore to bathe within reasonable limits, and also to go boating within a distance of a mile, on condition they did not land anywhere or come closely in contact with others out boating. They could not visit the steamer wharf nor post office, etc., but satisfactory provision was made for correspondence. All this was thoroughly appreciated by most of the guests, as the accompanying letter, handed to me a few days later and signed by them, will show.

One lady with her three children, however, took advantage of the liberty enjoyed and eloped, being aided in her flight by a newly-arrived gentleman and son from Detroit with an automobile, and during the night reached Utterson, a station on the G. T. R. twenty-three miles distant, and took train for Toronto. I immediately wired your Chairman, and I believe he corralled them in quarantine for a couple of weeks. As the runaways had not been bathed or clothing disinfected, I quarantined the American gentleman and his son immediately on their return, and made them thoroughly wash the automobile, take a carbolized bath, and I disinfected their clothing for several hours. I released them after two days' quarantine, with a warning not to again interfere with our health regulations.

As soon as a supply of disinfectants reached me, I had all clothing of the inmates and the whole house, nearly forty rooms, efficiently disinfected with formaldehyde.

At the end of ten days, no new cases having developed, I raised the quarantine, and so ended a satisfactory and interesting experience.

Dorset.—At Dorset, a neighbouring village on the same lake and in daily communication with Dwight, there were several cases of diphtheria, three proving fatal. These were under the care of the M. H. O's. of the Townships of Ridout and Sherborne, and were mostly cared for in an isolation building well removed from any residences. I visited Dorset on August 5th, and found everything then progressing satisfactorily.

Milton.—On November 5th I visited the town of Milton, in County of Halton, and there learned from Dr. Wickson, M. H. O., that diphtheria had been more or less prevalent since last spring. There had been twenty known cases during the last six weeks, and several suspected ones not seen by a physician, mostly in children. There had been one death.

The first case developed in a child who had recently returned from a visit to Toronto, the second in an adult female, but no connection between them. Later cases were traced to these. They were distributed in all parts of the town. The public school had been closed for a few days, but reopened. It was again closed, and at the time of my visit was being disinfected. There was no effective quarantine, as only one sanitary policeman for the whole town. Persons from infected families were out, as also patients mingling with the public. Other suspected cases were also seen out.

I visited one patient, now convalescent, a young man, in very unsanitary premises and in a chilly, dirty room. I visited the premises of several others. I also visited the closets at the school, where cesspools were being pumped out. The closets were in fair condition. I also visited open drains into which flush closets empty, and was shown where two flush closets empty into a pond and one into a creek running through the town. There is no sewerage system, but many cesspools dug in the clay, and some deep into the underlying gravel, where are wells probably fifteen to eighteen feet deep. There is a good water supply, obtained from springs on a hill.

I advised the abolition of all wells and compulsory connection with the water system; also the abolition of all pit closets and installation of the dry earth system, at least until all wells closed; also the prevention of flush closet discharge into the drains, creek, etc., as the town is not in a sanitary condition.

In a conference with Dr. Wickson, M. H. O., and Dr. Anderson, Mayor, I advised the establishment of a temporary isolation hospital, to which all patients should be removed, and an effective quarantine of all exposed persons for at least ten days, followed by a thorough disinfection of all infected premises.

Report on Scarlet Fever

By Dr. R. W. Bell, Medical Inspector.

Township of Euphrasia.—The only outbreak of scarlet fever which I have been called upon to deal with during the present year was in the Township of Euphrasia, in County of Grey.

A report received at this office stated that the disease was and had been prevalent in this township for several months. Your Secretary instructed me to investigate and deal with the matter as necessary.

On November 9th ult. I visited Thornbury and Clarksburg, in the adjoining Township of Collingwood, and through Dr. Moore personally, and Dr. Shultis, of Heathcote, and Dr. Williams, of Rocklyn, by telephone, learned something of the situation. Next day I drove out to Heathcote and saw Dr. Shultis. He had one patient in Township Collingwood, not seen during rash, but now suffering from sequelae and likely to prove fatal. He had seen cases some months previous in Euphrasia which others had pronounced German measles, and no precautions were taken to check the spread.

I next drove to Rocklyn, in Euphrasia, and there had a conference with Dr. Williams, M. H. O.; Reeve Ellis, chairman, and Mr. Curry, secretary, of the local Board of Health. Dr. Williams reported several cases in his immediate neighbourhood, which were quarantined and well in hand.

It was admitted by all that there had been many cases about Kimberley, in eastern part of township, for several months, no physician in attendance, and no precautions taken to arrest its spread.

Last year Dr. Williams had, by order of the Board of Health, investigated several cases, and he did a lot of disinfecting, but the municipal council thought his account too much (although they had to pay it), so this year he was instructed not to investigate or attend any cases outside of his own practice, unless officially reported to him by the attending physician. As no physician was in attendance in many cases, and in others the disease was called German measles, no cases were reported, and the disease ran riot until nearly every child in the neighbourhood of Kimberley has had it, the result of which will likely be seen later on by serious sequelae.

They excused themselves for laxity because other townships were lax, but I did not find this elsewhere. Admittedly most of the neglect was to save expense to the township. They complained of laxity in St. Vincent Township, where they reported a school teacher having returned to her duties in school while still desquamating; but it was only hearsay, and no name given.

A letter from Dr. Shultis, of Heathcote, dated October 18th ult., gave the names of a number of known and suspected cases, but no action had been taken. I also gave other names made known to me. I pointed out the liability of parents, etc., for not reporting these cases, and insisted on the M. H. O. being given authority to investigate all known or rumoured cases, and quarantine where necessary, and to thoroughly disinfect all premises where disease has been. This Messrs. Ellis and Curry agreed to, and also to have a meeting of the Board of Health called at once and decisive action taken to stamp out the disease. If not done, I threatened in your name to quarantine the whole township and at their own expense.

The same evening I drove into Meaford, and there interviewed Dr. Clark, M. H. O. of St. Vincent Township. He knew of no cases at present or recently in that township. He had none in his own practice, and none had been reported to him. He promised to try and get the name of the school teacher spoken of at Rocklyn, and investigate her case and any pupils if exposed, fumigate the schoolhouse, and deal promptly with the situation should the report prove true.

He reports the Board of Health of St. Vincent very liberal in allowing him full power where he deems necessary.

Next morning I called on Mr. Albery, secretary, Local Board of Health, and he had no reports of any scarlet fever in the township, but promised to at once investigate and, if necessary, the Board would take immediate action.

November 22nd. Dr. Williams writes that he has visited and disinfected a number of houses, and is speedily getting the disease under control.

Report *re* Typhoid Fever Epidemic and Cleaning up of Town of Cobalt.

By Dr. R. W. Bell.

To the Secretary,
Provincial Board of Health, Ontario.

SIR, A severe epidemic of typhoid fever having occurred in Cobalt, attributed largely to contaminated water and the unsanitary condition of the town, the supervision of the necessary cleaning up was placed in our hands by consent of the local authorities and the approval of the Honorable Provincial Secretary.

Acting on instructions from you I proceeded to Cobalt on September 8th ult., and on the following day we laid out our plan of action.

At this time there were about 80 cases of typhoid in the "Red Cross Hospital" owned and supported entirely by the "Temiskaming Mine Managers' Association." All these cases were from the mines of the town or adjoining townships of Coleman, Bucke and Lorraine.

As there was no civic hospital, other cases were being treated at their own homes, and I could not get a record of them. Many other cases immediately on being suspected left the district for their homes in older Ontario.

The town having a population of about 6,000, and probably another 3,000 within a radius of five miles, is situated on the shore of Cobalt Lake, which is little better than a cesspool, about three-quarters mile long and 200 to 400 yards wide, the water being undrinkable, because of arsenic contained therein and the sewage. A considerable portion of the drinking water used in the town has been imported Laurentian water, or water brought from Sassaginaga Lake, a mile distant, and delivered from door to door by carters.

A few months ago a temporary system from this lake was installed with pipes laid on the surface of the ground. This supply was known to be good. The larger proportion, however, of the citizens we found were using water for all purposes from shallow wells dug in the soil from four to six or eight feet deep between the sloping rocks, and these were full of surface water containing the drainage from the houses and closets erected on the rocks, or as frequently on the soil adjoining them and often only a few feet distant.

In some instances we found small 16x25 feet lots leased at high rentals from some of the larger mining companies, and the structure erected thereon covering the whole lot and no sanitary conveniences whatever provided; in others possibly five feet was reserved in rear on which to erect a closet and get a rear entrance from the street provided by the company, about 16 or 18 feet wide. Occasionally a small vacant lot adjoined a half dozen of these shacks, and it was used in common by all, for a well, a closet or two, and general dumping ground for all kinds of garbage and refuse, but responsibility for its condition was repudiated by all.

I may state that there is no sewerage system in town, only one semblance of a drain, partly wooden box and mostly open, from the Red Cross Hospital across several lots in the centre and along street sides, receiving in its course the slop of hotels, laundries and closets, etc. This we found so choked up that the basements of houses were flooded, in one instance the press room of the "Daily Nugget" until the workmen were for days wading in 8 or 10 inches of this filth, with rubber boots on, to carry on their work. With the damming up of this same drain on Argentite Street you are personally cognizant, as you will recollect our opening it up ourselves on more than one occasion.

You also visited several of the overcrowded Chinese rooming houses and know of the unsanitary conditions seen there.

Considering these conditions and more to be told, is it any wonder that typhoid fever was rampant.

Now as to the cleaning-up process, I took general supervision, aided by Sanitary Inspectors Geo. Young, H. C. Parker and R. Johnston, of the Provincial Board of Health, and R. Holmes, local Sanitary Inspector.

The local authorities were to furnish us with such teams and men as we required and render all assistance. I may here say that for the first week no member of the local Board of Health ever came near us excepting Mayor Lang, who worked heroically and was ever at our beck and call, but after that time when I threatened to report the lack of assistance, they came to our aid and did all possible to help us.

As you are aware, we divided the town into sections, and each of our Inspectors taking a section visited every house in it, examining the premises outside and in, and serving notices where necessary to clean up within 24 hours, keeping a record on a stub of such notice. This work took nearly a week, as over 600 premises were visited and over 550 notices served.

The accumulation of garbage and filth was most amazing and not restricted to the poorer sections of the town, as can be surmised by the large number of cleaning up notices served, in fact the serious fire of two months previous was in many respects a perfect God-send, as it had burned over a large section of the dirtiest portion of the town, destroying in its ravages an immense amount of garbage and refuse. On most premises visited we found the accumulation of from several months to several years' garbage, and as many occupants of houses were only temporary residents, there was an utter indifference as to the disposal of it. Among many other more permanent residents the gradual accumulation had not been noticed, and familiarity with it had bred contempt, until this typhoid outbreak had caused alarm. Even, however, in the face of this there were many still perfectly indifferent, particularly about the boarding houses and restaurants, as also rooming houses, were the conditions bad, kitchen refuse and bedroom slop being thrown out about their back doors and not infrequently on to the street. Soon after my arrival I was given to understand that the principal business block, situated on the Square, was notorious among the citizens as one of the dirtiest and most unsanitary buildings in town, vieing with the lowest Chinese rooming house in this respect. Our inspection proved this true. The ground floor was occupied by stores, etc., the first floor by offices, second floor, offices and roomers; third floor, all roomers, in all probability 100 occupants. The halls and rooms were filthy, and for all these occupants there was only one closet, and that on the third floor, a dark one inside of a dark room, a box closet, without dry earth or ashes and so vile one could not use it without being contaminated. After my report, the local Board of Health ordered the installation of 18 closets in this building immediately or all tenants would be ordered out and the building closed.

In the north end of the town we found a dairy of some 35 cows, with the filthiest surroundings. The barn was on the hillside, with apparently two or three years' accumulation of manure on its lower side, and about 20 yards further down the hill a new well had been dug and pump put into it three days previous. A few yards to one side, 40 or 50 hogs were rooting and three dead ones were decomposing in the hot sun. Close beside these was a bunk house with accommodation for 40 men, with a lean-to stable for a dozen or more horses on its upper side and all filth soaking under it; both bunk houses and stable were occupied each night. About 30 more hogs were found a short distance away belonging to the same herd, and wallowing in swill brought from town and emptied from barrels in the hollows between the rocks. The water for use about this dairy for washing cans, etc., was from a spring between the roots of a stump on the road side behind the house, and around which the hogs were rooting. A few yards distant, on higher ground, were several houses in which were typhoid patients, and the drainage from these houses easily reached the spring. Enquiry revealed the fact that many hogs of these herds had died from some unknown cause during the previous few months. Suspecting hog cholera as the cause, the Veterinary Director General, Dr. Rutherford of Ottawa, was at once communicated with, and he immediately sent Dr. Perdue, V.S., to investigate. He soon diagnosed hog cholera, and slaughtered the remainder of the herds, 80 hogs, now reduced by previous deaths from 112, and only passed inspection and accepted as fit for food 17; all destroyed, were burned and premises thoroughly disinfected and placed under quarantine for three months.

The sale of milk from this dairy was stopped until premises put in a sanitary condition, but not before the owner had been prosecuted and fined.

Many open trenches left by the Mining Companies were found in all sections of the town, and these were convenient receptacles for the disposal of garbage, etc., by those who would not go to a dumping ground about three miles distant. These were ordered to be filled.

On our suggestion the Municipal Council passed By-Laws *re* Sale of Milk, prevention of keeping hogs in municipality, rooming houses and overcrowding, also cleaning of closets and removal of garbage, etc.

On completion of our first round of inspection and serving of notices, a second visitation was started to see if orders had been complied with. A few had responded to our orders and probably a couple of hundred loads had been removed or burned. A second warning was given, and as many said they could not get teams to cart away the refuse, we instructed them to place it where teams could conveniently get at it either in yards or on the roadside, and we would remove it for them. Here we applied to the town authorities for teams and men to aid in cleaning up. Although dozens of idle men were about the streets, it was difficult to secure more than 12 or 18 for scavenging work, and from 4 to 8 teams for cartage. As the nearest available dumping ground was 3 miles distant over a bad road, the work, with so little help, seemed appalling, however with the consent of some of the Mining Companies, we utilized several trenches in the outskirts of the town, into which we put old irons, and on these with the aid of coal oil destroyed much garbage and whatever could be burned, saving a long haulage, but had to take to the distant dump all excreta and stable manure. The work proceeded rather slowly owing to frequent bad weather and to teams continually leaving us for more congenial work. Owing to many persons being persistently negligent or defiant regarding our orders, it now became necessary to prosecute them before the Police Magistrate, and about 50 persons were fined, amongst others two Aldermen and the Chairman of the local Board of Health.

Having gone well over the town and got the scavenging well under way, I kept Inspector Holmes to look after the scavengers, and with Inspectors Young, Parker and Johnston undertook a thorough inspection of the mines and their surroundings. They inspected the bunk houses, kitchens and dining camps, stables and all other out buildings, water supply and drainage, etc., also the shafts, tunnels and drifts, etc., and made daily reports which were typewritten and sent to you with my daily report of work done, etc. It was found that much cleaning up was required about most of the mines, that the employees of the mines, were drinking water, as a rule, from the crevices in the rock, and that urinating and defecating in the tunnels and drifts was a common occurrence, although denied at the outstart by the mine managers, thus polluting the water where it percolated from the upper to lower levels. Defecation was found in the tunnels of at least one-third of the mines visited, some 88 in all, including the works of two power companies.

On the 18th October I considered our work as about completed, so handed over the control to the local Board of Health, and despatched Inspectors Parker and Johnston to other points, leaving Inspector Young for a few days longer to aid the local authorities. Under our supervision 1,066 team loads had been removed or destroyed, and 74 of the foul polluted wells filled.

During the earlier weeks of our work, typhoid continued to increase until the Red Cross Hospital had eleven more hospital tents with ten patients each erected on the Coniagas property, and had in all, from 1st August to October 16th (eleven weeks), 307 cases, while the town M. H. O. reported for the same period 533 cases outside the Red Cross Hospital, divided as follows: Adults, 432; children, 101; total, 533; or males, 339; females, 194; total, 533; or a total with Red Cross Hospital cases of 840.

About the middle of September the civic authorities established a tent hospital on the Haileybury Road with four military hospital tents and an additional frame building for kitchen, office, storeroom, etc., and sleeping quarters for the nurses. The Presbyterian Church also kindly loaned a large marquee tent, which was of great use for hospital purposes. The I. O. F. also very expeditiously erected a frame building for about ten patients adjoining the Civic Hospital, and when not filled with their own members placed their spare beds at the disposal of the town authorities.

From now on the number of new cases steadily decreased, but as the year closed Dr. Hair, M.H.O., reported for the year a total of 1,102 cases.

At the date of my departure, October 18th, the contract had been let for the installation of a permanent water system from Lake Sassaginaga and work had commenced, also for a sewerage system, but little can be done before winter, when the surface pipes will be frozen up, and the cartage system will be in vogue for another season. However, this will not be so bad if the abominable wells can be kept closed, but only eternal vigilance will accomplish this, as many were repeatedly opened up within a few hours after we had filled them.

A civic scavenging system is absolutely necessary, as most of the temporary residents are indifferent as to cleanliness; in fact the Police Magistrate told several of the delinquents we prosecuted, that they did not seem to know what dirt was.

The Red Cross Hospital Board spared neither means nor time in their efforts to stamp out the disease, and much is due to Mr. R. P. Rogers, manager of the Coniagas Mine, and Chairman of the Board, who gave his services freely day and night in relieving the afflicted.

I fear that unless our suggestions for the furnishing of a pure supply of water in the mines, and also the use of portable privies therein are carried out, there will be a continuance or recurrence of the disease, especially as many of the men returning to work will be typhoid carriers.

I trust our efforts in cleaning up the town, however, will not be without good results, and that a repetition of them will never be called for again in Ontario.

All of which is respectfully submitted.

R. W. Bell,
Medical Inspector, Provincial Board of Health.

December, 1909.

THE SANITATION OF COBALT AND ENTERIC FEVER.

By Chas. A. Hodgetts, M.D.

The prevention of disease is the chief function of a Board of Health. That this has been one of the objects of the Provincial Board of Health in respect to Cobalt is particularly true as will be seen from the following reports of various officers of the Board, who have from time to time visited the place since first it appeared on the map of New Ontario—when it was a mere mining camp, being in the unorganized district (hence directly under the control of the Board), and so year after year until it had taken upon itself the responsibilities of a municipality. Even then, considerable attention was given to its sanitation, the Medical Inspector, Dr. Bell, having visited it on as many as twelve occasions.

Indeed no other place in the Province has received so much attention as Cobalt. In the early days the Board through its officers has been able to exercise direct authority with most satisfactory results, for undoubtedly at that time outbreaks of Typhoid Fever were prevented by the action then taken.

The several reports as made to the Board since the month of September 1905 are herewith reproduced with the object of demonstrating the particular pains taken by the Board to prevent disease in this mining district so as to make it a safe place for miners and others to reside in and for people to visit for business purposes, and at the same time to indicate where the blame may very properly be placed for the Typhoid outbreak which has (unfortunately) occurred in the town and district—an outbreak which, with the exercise of ordinary precautions on the part of the citizens and a proper oversight of the Local Boards of Health concerned, could have been averted, and a repetition of which may happen again unless these same Local Health Authorities will live up to their responsibilities as placed upon them by the Public Health Act and which it is clearly their duty to discharge. They have unfortunately had a very severe object lesson and, if a repetition occurs, must be prepared to assume the responsibility of public criticism.

The report of Dr. Bell and Inspector Young clearly set forth the unsanitary conditions of the town as existing at the time of the outbreak and the methods adopted to "clean up". Written and verbal directions have been given as to the methods to be adopted by the Corporation and Local Board of Health to keep the town clean.

The work is clearly a municipal one—not to be assumed by the Province—and in the public interests it is to be hoped it will be followed out. It is also hoped that the citizens generally will cordially co-operate by each striving to keep his own house and premises in a sanitary condition.

In 1906 I reported as follows to the Board on the sanitation of Cobalt.

The rapid increase in the population of this district consequent upon the discovery of valuable mineral deposits, has necessitated from the outset a sanitary supervision on the part of this Board, owing to the fact of the district being unorganized.

With a view of ascertaining the exact conditions and the particular dangers incident to camp life and the erection of a large number of temporary buildings, Dr. Bell, Medical Inspector of the Board, was requested to visit and report, as early as March 6th, 1905, when there were only three camps in operation. Since that date he has repeatedly visited the district, enforcing the sanitary regulations of the Board as regards camps in the unorganized districts—even going so far as to prosecute in one instance a company, the manager of which refused to comply with the regulations. As a result of the Inspector's work, all the mining companies provided medical attendance and hospital accommodation for their employees, and notices were issued in the name of this Board ordering "all water" to be boiled for drinking purposes, and the Provincial constable was instructed to report any failure on the part of the inhabitants to observe the regulations of the Board.

In March last Dr. Amyot was sent to Cobalt upon receiving word that ice was being cut for domestic purposes, from Cobalt Lake, and as a result of his visit the cutting of ice from this lake was discontinued and a good supply obtained.

Since Dr. Amyot's visit the municipality of Coleman has been formed, which removes the camps from the direct supervision of this Board, and places the sanitary arrangements of Cobalt and the Township generally, in the hands of the Local Board of Health.

I am pleased to inform this Board that the Honourable the Provincial Secretary has appointed Mr. S. Scott as a temporary sanitary inspector, whose duty it will be to assist the local authorities in the enforcement of the sanitary laws of the province. Already good work has been done, much however remains to be done, and in a short time two hospital tents, with beds, etc., will be forwarded to Cobalt to be used in case of any outbreak of a contagious character—and there is already under consideration the securng of a pure water supply for immediate use.

The reports of the officers as referred to are herewith appended, and, often these follow the final report of Dr. Bell and Sanitary Inspector Young.

REPORT BY. R. W. BELL, M.D., MEDICAL INSPECTOR.

THE MINING CAMPS, COBALT, APRIL 3RD, 1905.

On March 6th I visited the Mining Camps at Cobalt in the Temiskaming District. As these have only been in existence a few months and permanency uncertain, the buildings and accommodation were not found quite up to the requirements of the Public Health Act. The prospects now having improved very much and more buildings being erected, I arranged with the Managers to provide more and less crowded accommodation for their employees. With the exception of crowding, the health provisions were satisfactory. Four Camps are in the immediate neighbourhood, two employing about 30 men and the others 8 to 10 each.

MEMO. BY R. W. BELL, M.D., MEDICAL INSPECTOR.

Re REFUSAL OF MINE MANAGER TO COMPLY WITH REGULATIONS.

Sept. 21st, 1905.

I beg to report that at Cobalt, Ont., I called a meeting of Mine Managers for Tuesday, 19th inst., to consider the most desirable method of providing hospital accommodation and medical attendance for the camps, in accordance with Clauses 4 and 12 of the Sanitary Regulations for Unorganized Districts. Of 21 notified only seven attended. Six of these reported that they had contracts for Medical Attendance and hospital accommodation with either Dr. Field or Dr. Young, of New Liskeard, on payment of fifty cents per month, and no further expense to the men. That both of these doctors had representatives constantly in Cobalt to look after the camps in the vicinity.

Mr. W. J. Wells, Manager Baffalo Mining Co., whose mine is within the town site of Cobalt, stated that this Co. had no contract for Medical Attendance for their men, and would not make one, as the men could employ whom they pleased. On being remonstrated with for such a stand and its being pointed out that there was a penalty for non-compliance with the Act, he replied—"Go ahead, prosecute me, I will pay the fine; put on the screws as quick as you like, etc, etc." He, however, stated he was authorized to subscribe Two Hundred Dollars, or a carload of lumber, for the erection of a hospital, if I would accept it, but he would not provide in any other way, nor any further, for the employees of the Company.

May I ask if it is the desire of the Board that I formally charge the Manager of this Mine before the Stipendiary Magistrate of the District, with non-compliance and refusal to comply with the Act.

REPORT *RE* SANITARY CONDITIONS, ETC., OF COBALT AND ADJACENT MINES

By Dr. R. W. Bell, Medical Inspector.

Sept. 29th, 1905.

To the Chairman and Members, Provincial Board of Health, Ontario.

Gentlemen.—Doubtless you are all aware of the recent discoveries of silver and other valuable metals in the Temiskaming District, mostly in the Township of Coleman, 103 miles north of North Bay, on the line of the T. & N. O. Railway. As a result there has been a sudden influx of prospectors, miners, etc., and on the shore of Cobalt Lake, a mining camp or town has within a few months sprung into existence.

I visited this place on March 6th, when there were only four mines in operation, and again passed through in early April, and also in the middle of May. At the latter date, there were not more than half a dozen small board or log buildings on the present town site.

Owing to communications received, regarding the rapid growth of the camp and its unsanitary condition, it was deemed advisable for me to visit it again this month. I reached there on 14th inst., and found a population on the town site, of about 600, sheltered in about 60 or 70 houses, mostly shacks, and as many tents. Many of these people are engaged in prospecting, and are independent of those actually engaged in the mines, while many avocations are represented. Two banks (one doing business in a tent), about a dozen general stores, with several restaurants, pool-rooms, barber shop, photograph gallery in a tent, two drug stores, and numerous other places of business were in full swing.

So far no sanitary precautions had been taken. About a dozen closets of the pit class were in use, and about as many more were in course of erection. Several houses were situated on what since the survey a few weeks ago will be streets, and have to be moved.

A visitor walking about the place between the houses and stumps, had no way of telling whether he was on a street or private lot. The town site is on the shore of Cobalt Lake, which is about a mile long and 300 or 400 yards wide, the railway track running close along the bank, ten to twenty feet above the water, while the location rises rapidly and very roughly immediately beyond the railway track. The natural drainage, therefore, is all towards the lake, which along the shore is badly contaminated. There is only one natural "spring well" in the place, from which the whole local domestic supply of water is obtained, and it is so situated at the base of a rock, as to receive much surface water, and much filth. The owner was taking steps however to have it thoroughly cleaned out, and protected as far as possible from contamination, and going to have it closed in, and charge a fee for its use. This will, therefore, cut off the free use of any but the lake water from the citizens.

With the Provincial constable, Mr. Caldbick, recently sent there by the Government and who is Sanitary Inspector, I made a thorough inspection of the place.

The erection of pit closets was at once stopped, a slaughter house in a most undesirable place, with hogs devouring raw offal in rear, was ordered to be removed; also a large manure pile both a nuisance and a menace to health, as well as unsightly, and which turned out to be on a street in the most thickly populated portion. The Sanitary Inspector was instructed to prosecute any persons committing or placing unsanitary nuisances where they might prove detrimental to health.

A meeting of the citizens was being held in the reading tent, the first evening of my visit, for the purpose of organizing a School section, and I seized the opportunity of addressing those present, about twenty in number, in regard to sanitary matters. The following day, I caused the following notice to be posted in several conspicuous places.

Notice.

By order of the Provincial Board of Health, the use of pit closets in Cobalt and vicinity, is forbidden. The conversion of those already in use to dry earth or other satisfactory kind is at once required.

The deposit on the ground of kitchen and other garbage or refuse, where it may contaminate the water supply or prove a nuisance, is forbidden. Boxes or other suitable receptacles for it must be provided and emptied at a place approved of by the Sanitary Inspector at short intervals.

Sewers or drains which may pollute the water supply or prove a nuisance, are also forbidden.

(Signed) GEO. CALDBICK.
Sanitary Inspector.

Cobalt, Sept. 15th, 1905.

Soon after my return, I obtained from your Bacteriologist, a report of his examination of samples of water shortly before sent him, from spring furnishing most of the drinking water of the town, and also from Cobalt Lake. His report says, "The spring shows infection with intestinal bacteria. The lake shows infection with suspiciously intestinal bacteria. Neither of these waters should be used without previous boiling."

As these were the only sources of water supply convenient, and as they were still subject to much contamination, several copies of the following notice were sent to the Sanitary Inspector, to post in conspicuous places, for the information of the citizens.

NOTICE.

Samples of water from Cobalt, taken from the spring near Clark's, and also from the lake, have recently been examined by the Analyst of the Provincial Board of Health, and both have been found to contain germs which render their use dangerous. The public are therefore warned that these waters should be boiled, before they can be safely used.

By order of the Provincial Board of Health.
TORONTO, Sept., 1909.

Having taken these steps to get the sanitary conditions of the town improved and started right, I turned my attention to the immediate location of the mines. I learned there were about eighteen miles being worked, and all within a radius of about three miles from Cobalt. I visited several of them, and found a decided improvement in the accommodation provided the employees, since my visit in March.

Nearly all had made contracts for medical attendance on their men, with either Dr. Field or Dr. Young, of New Liskeard, who both had representatives at Cobalt, but there seemed lack of hospital accommodation as required by the regulations. As the largest of the camps at present consists of 60 or 70 men, and they vary from that number down to 8 or 10, these smaller ones could scarcely be expected to erect a hospital building at their individual mines. I therefore decided to call a meeting of the mine managers, to consider the matter, and sent the following letter to every mine manager whose name I could get, and several prospectors, some twenty-two in all.

COBALT, Sept. 15th, 1905.

DEAR SIR,—You are requested to attend a meeting of the Mine Managers of the Cobalt District, in the reading tent, Cobalt, on Tuesday, Sept. 19th, at 1.30 p.m. sharp, for the purpose of considering the most desirable method of providing hospital accommodation and medical attendance for your camp, as required by the Public Health Act.

(Signed) R. W. BELL,
Medical Inspector, Provincial Board of Health.

At the time appointed only seven responded to the call. To those present I explained the regulations, and pointed out that they were required to provide a suitable building for a hospital, and in it provide board and nursing for their employees, in case of illness or accident, as well as contract with a physician for attendance.I suggested that all, or any number who desired, might unite in the erection and maintenance of a hospital at Cobalt, the most central point, and within easy reach of most of the camps.

Six of those present announced that they had contracts with physicians at New Liskeard for medical attendance, and that they had provided hospital accommodation and board at the same place, and without any fee being charged to the men, beyond that authorized by the regulations for medical attendance. This statement was corroborated by Drs. McLaren and Aikins, the local representatives of the New Liskeard physicians who held the contracts. I stated that I did not think the hospitals at New

Liskeard would be satisfactory to your Board, as too far away, but some of the managers said the outlet from their mines was *via* Haileybury, and when there, they were as near New Liskeard as Cobalt. The manager of the Buffalo mine said he had no contract with a physician, and would not make one, and if we wished to prosecute him for refusal to obey the regulations, we could "put on the screws as quick as we liked." He took this ground because he had some grievance against a physician at a mine where he had been formerly employed. Afterwards he stated, if the Provincial Board wished to build and maintain a hospital at Cobalt, he would give two hundred dollars, or a car load of lumber towards its erection. As I was not erecting or soliciting subscriptions for a hospital in your behalf, I had to inform him his offer was respectfully declined, but that he had better erect a building at his mine, which is inside the town site, or unite with others to do so, and otherwise conform to the sanitary regulations. He again very curtly and abruptly refused to do so. I suggested to those present that they should appoint a committee, and confer with the absentees, and try to come to some united action, as I felt sure the cost to each would be much less than if they were compelled to build separate hospitals, and the fact of the contract physicians placing their representatives at Cobalt showed they did not consider New Liskeard a near enough point from which to operate the Medical Department. However, they did not feel disposed to take any action, and the meeting broke up.

As the fee for medical attendance and medicine charged to each man is only fifty cents per month, it seemed almost incredible that the contracting physicians would without further payment, provide on behalf of the mine owners hospital accommodation and board, with trained nurses as was asserted.

I requested those present to send to your secretary copies of their contracts, so you might make proof that the regulations even at the distance of New Liskeard were being so generously carried out.

Before taking further action, I deemed it best to return and confer with your Secretary, and as a result the following letter was sent to each of the mine managers on September 23rd instant.

Dear Sir,—Enclosed find amended copy of Act and Regulations for sanitary control of Unorganized Districts in Ontario. Your attention is called to all its clauses, but particularly to clauses 2, 4, 8 and 12.

Kindly let me know by return mail, the name and address of the physician with whom you have contracted (clause 12), also what provision you have made for hospital accommodation for the men in your camp (clause 4).

Dr. R. W. Bell, Medical Inspector of the Board, who has just returned from your district, reports the majority of the camps are in the immediate vicinity of Cobalt. Should you desire to join with one or more of the mine owners, in the establishment and maintenance of an approved hospital in Cobalt or close vicinity, it will be acceptable to this Board.

The fact of the physicians at New Liskeard, with whom I understand several mine owners have contracts, having representatives constantly at Cobalt, would clearly indicate that that is the most desirable or convenient place for a hospital.

The utilizing of private hospitals at New Liskeard, miles away from your mines, is clearly not in the interests of your employees, nor in compliance with the Act.

Yours respectfully,
(Signed) Chas. A. Hodgetts, M.D.,
Secretary.

I know from conversation with several of the mine managers, that although they think they are technically complying with the Regulations by providing hospital accommodation at New Liskeard, still they admit that Cobalt would be a much better point.

Some others in the neighborhood of Kerr and Giroux Lakes, say, Cobalt, is as difficult to reach in summer as New Liskeard, and would prefer a hospital at Haileybury.

The difficulty at present is to get the responsible parties sufficiently interested in the necessity for hospital accommodation, as they are all so engrossed in getting their mining operations into shape.

Fortunately, so far, there has been very little illness, and no serious accidents, and until there are, it will be difficult to get them to waken up, unless the penalties provided by the Act are enforced for non-compliance. I would like specific instructions in regard to this matter, and especially in connection with the defiance of Mr. Wells, manager of the Buffalo mine, whose action I fear, if allowed to go unnoticed, will be the cause of trouble in the future.

REPORT ON PROSECUTIONS AND HOSPITAL ACCOMMODATION AT COBALT.

By R. W. Bell, M.D., December 23rd, 1905.

In accordance with instructions received at your Board meeting in October last, *re* prosecution of mine owners who refused to obey the Sanitary Regulations in Unorganized District, I visited Cobalt, in the Temiskaming District, during the first week of December, and again interviewed Mr. Wells, Manager of the Buffalo Mining Co., who had in September positively refused to comply with the Regulations. He was still of the same mind, and declined to make contract for medical attendance on his employees. I therefore laid an information before Magistrate Hartman of New Liskeard, charging him with "Neglect and refusal to contract (under clause 12) with one or more qualified medical practitioners for the medical and sanitary supervision of his employees and works." He appeared in court and offered no defence, except that he thought it an unjust law. The Magistrate fined him ten dollars and costs—four 75 / 100 dollars, in all fourteen 75 / 100 dollars, and warned him to obey the law, or a much heavier fine would be imposed if again brought up.

The following day he entered into a contract with Dr. Young of New Liskeard, for the required medical attendance.

I might here add, that the required hospital accommodation is not furnished by any of the mine owners at Cobalt, or their mines, and that the reported contracts in regard thereto are not being carried out. Both Drs. Field and Young of New Liskeard (whose representatives at Cobalt in September stated they were providing hospital, nursing and board for the medical fee of 50c. per month per man contracted for), now state that they are not furnishing these requirements for this fee. Such being the case the mine owners will have to pay the fees in accordance with the Act, if they continue to utilize the accommodation at New Liskeard, which however, is too far away from most of them, and as your Secretary wrote in a circular letter to each of them on September 23rd, "is clearly not in the interests of your employees, nor in compliance with the Act." He also wrote, "kindly let me know by return mail the name and address of the physician with whom you have contracted (clause 12), also what provision you have made for hospital accommodation for the men in your camp (clause 4)." Only nine replies were received, two saying they had contracted for hospital with the Doctor—two can provide at their camps, and the others have none or ignore that part of the request.

In September I suggested on your behalf to a meeting of mine owners that a Union hospital at Cobalt would be acceptable to your Board, but no action has been taken, therefore I see no other course to pursue, but to insist on a strict enforcement of the Regulations requiring hospital provision at each camp, and prosecution if neglected.

REPORT ON COBALT WATER AND ICE.

By Dr. Amyot.

At the direction of Dr. Hodgetts, a visit was made to Cobalt, New Ontario, on Tuesday, February 27th, 1906.

The population is variously estimated at from 1,200 to 1,500, much of it a floating one. The town is an unorganized one.

A Justice of the Peace and a constable represent the law.

The houses are for the most part temporary shifts built on top of the ground, with very little reference to streets of which there are no fixed ones. The houses are placed as close together as possible and in all directions. The land is becoming very expensive. Only the day before my visit, a small lot large enough for a house without a yard sold for $1,500.00. Other properties are being held for like figures.

The water is got from a couple of very questionable springs amongst the houses and through holes in the ice from Cobalt Lake. Previous analyses of these waters have shown all of them to be infected with intestinal bacteria, showing the liability of them to typhoid infection if other intestinal discharges should have typhoid bacteria in them, with of course other diarrhœal causative agents as well. There have been five cases of typhoid in the district since Christmas, three of which have probably been infected elsewhere, but the other two seem to have got their infection in the town.

The settlement is scattered over three more or less parallel ridges radiating somewhat to the north. Nearly one quarter of the houses at the present time drain towards Cobalt Lake, which has an area of about 50 acres. Its infection is thus accounted for. The other three-quarters drain into the valleys between the ridges. The ridges are covered with houses and the valleys are filled with them. There is one water closet about to five houses. Some of them seem filled to above the seats, and otherwise in a most filthy condition. Those houses having none have discharged on the ground. Garbage, wash water, urine and faeces all mixed together in frozen heaps out in the open, on top of rock, practically bare in its greater area. The cold has been steady so far and all is frozen, but when the thaws come the accumulations will be all washed into the valleys and the lake, polluting all the water sources. If nothing is done to correct the evils before the thaws, then in all human probability there will be a severe outbreak of disease in and about the settlement.

The township is now being organized, and notices of nomination and election of township officers are out. The following recommendations would seem to be indicated.

1st. That each "house-holder" be directed to clean up all the *debris* about his place and build a proper outhouse of the dry earth type.

2nd. That the township get the right to some piece of property near the town where the gathered up material might be dumped, preferably burned up. All the property is taken up but it is quite possible that a suitable site could be arranged for with some of the mine owners.

3rd. Under the circumstances a daily gathering of refuse should be established, the man gathering to be an officer of the town. It has been suggested that the town itself supply at the minimum cost a uniform kind of dry earth receptacle for the dry earth closets.

4th. The settlement should then at the earliest possible date make arrangement for an unquestioned municipal water supply—possibly from "Clear Lake." None of the waters in the town or in the immediate neighborhood are safe and especially is this so with reference to the springs in the town and of Cobalt Lake.

Some ice had been cut from Cobalt Lake. This water is questionable and of course the ice also. Those who had cut were instructed not to use it except for cooling purposes. As far as could be found only two had cut this ice, a general grocer and a butcher. Both understood that their cut is not to be used except for cooling purposes. They had already stored what they had cut. Future cutting was prohibited. A better supply could be got with only a slightly longer haul from Lake Sasaginaga at the back of the settlement. This Lake, as well as "Clear Lake," is situated much higher than the town and there are practically no habitations about it.

REPORT OF G. E. YOUNG, SANITARY INSPECTOR.

DR. CHAS. A. HODGETTS,
Chief Health Officer of Ontario.

DEAR SIR,—On account of a severe epidemic of typhoid fever in Cobalt, caused by bad water and filthy surroundings, and which the local Board of Health were not able to cope with, the assistance and co-operation of the Provincial Board of Health was asked for. I was called on, along with Inspectors Parker and Johnston (who had previously served under the Board of Health in Toronto), to assist me in the work of sanitation in that town.

Starting work under your instructions and with supervision of Dr. R. W. Bell, Provincial Medical Health Officer, we served over six hundred notices on owners of homes and tenants of houses to clean up and disinfect.

The general conformation of the locality seriously impeded the sewerage of the town, and large blocks were just as nature left them, sewage and other filth being allowed to run at large on the surface, and while we found a few of the citizens trying to carry our sanitary measures, the rank and file were just drifting along and paying no attention to those matters. One dairyman, who kept between thirty and forty cows, selling milk around town, had not removed the manure from his barns for years, and had also a herd of hogs running at large which were drinking and wallowing at a spring which he used for house use and washing milk cans. This herd was effected with cholera. Several were lying dead in the yard, exposed and rotting. At another part of the town a well used by hundreds was fed by a small stream coming down from a mine where garbage, old clothes, manure, tin cans, and a number of closets were draining into; still another case where eleven loads of excreta and other filth had been allowed to lay and fester in the sun for years around a large boarding house. It is needless to mention that we found several typhoid patients here.

Wherever a few feet of earth was found above the rock the householders had put down wells, these frequently getting the drainage of garbage pit, closet, etc., from a short distance above.

We also visited boarding houses at all hours of the night so as to view the conditions more correctly, in many cases finding them overcrowded and herding like animals, little or no ventilation, and not half the air space as required by law.

This was the situation that met us along with hostile indifference, in some cases, I might say, to carry out our work by the easy manner in which the local board had handled these matters, so that when we came to revisit we found a large number had paid no attention to our instructions, and we were forced to take extreme measures by laying informations in the police court against them, and in all cases secured convictions.

We were occupied in this work about nine weeks, and when winter put a stop to our work the streets and town were well cleaned up and all surface wells filled and a large amount of sewerage put in. The Council were also passing garbage and other by-laws tending to good sanitary conditions. I also wish to thank Mayor Lang and a few other gentlemen for the able assistance they gave us in this work.

As Dr. R. W. Bell, Provincial Medical Health Inspector, was on the ground and supervising operations all the time, I have gone into these matters only in a general way, as he had all statistics and details I expect he will so report to you.

All of which is respectfully submitted.

(Signed) Geo. E. Young,
Inspector, Provincial Board of Health.

Cobalt, Oct. 31, 1909.

Dr. Chas. A. Hodgetts,
Chief Health Officer of Ontario.

Dear Sir,—While we were at work in Cobalt a large number of typhoid patients were being brought in from the adjoining mines in Coleman and Bucke Townships to the Red Cross Hospital there, and as it was considered necessary by you to have those inspected also, Parker, Johnston and I inspected a large number where operations were in progress, going down the shafts and travelling miles of drifting. With a few exceptions the surface surroundings were clean, but we found men using water taken from the rock for drinking in the lower levels and using the higher levels and cross cuttings for urinals and closets, even where the managers told us the men were liable to be discharged for doing so.

I found at the Cobalt Hydraulic Company, where barrels cut in two had been improvised for portable closets (these being removed and cleaned regularly), and good water used, there was very little sickness of a serious nature. The managers said they would not be without them, as they were a long move toward good health and also profitable, saying nothing of the cleanliness.

Where we found mines deeper than one hundred feet and with drifting we drew the mines managers' attention to clauses 12 and 39, section 164, of the Mining Act, where they are required to install portable closets and furnish good water for the use of the miners below; but in this important work we found serious obstacles put in our way by the jealousy of someone in authority around the mines, who imagined we were trespassing on his duties. From my own observation, I would suggest that this matter be made compulsory in the law without any loophole of escape, as men will not always come hundreds of feet to the surface, especially in cold weather or if taken suddenly ill.

I also inspected mines in South Lorraine, the power plants on the Montreal and Matabetchewan Rivers (all unorganized territory), the town of Haileybury, the village of Tomiko and the mining plant at Rib Lake.

The South Lorraine Mines had good water, reasonably clean, with a resident doctor; no sickness of a serious nature had occurred here. As these are new mining camps there was no accumulation of garbage, etc.

At one of the power plants I found the men seriously overcrowded and the surroundings filthy, especially around the bunk houses and kitchen, and I was forced to take this matter into the police court. Another had a polluted water supply; this I ordered changed and the place cleaned up. Several cases of fever had occurred here; while another that had clean premises and a supply of good water had no serious sickness. All these companies had resident doctors also.

At Haileybury, where there was a lot of fever, I met the Council and Local Board of Health, two sanitary inspectors were appointed, and I accompanied them through the town. We got several convictions here, which had a salutary effect on the others, in the end getting a large amount of cleaning up done. With the help of the new sewerage system that is being put in, the town will be reasonably healthy.

At the village of Tomiko I found fever existed in a few families that were using water out of two polluted wells; these I had filled up, there being other good water wells in the village. I had a lot of cleaning done here, and Dr. McMurchy tells me no new cases of fever have developed.

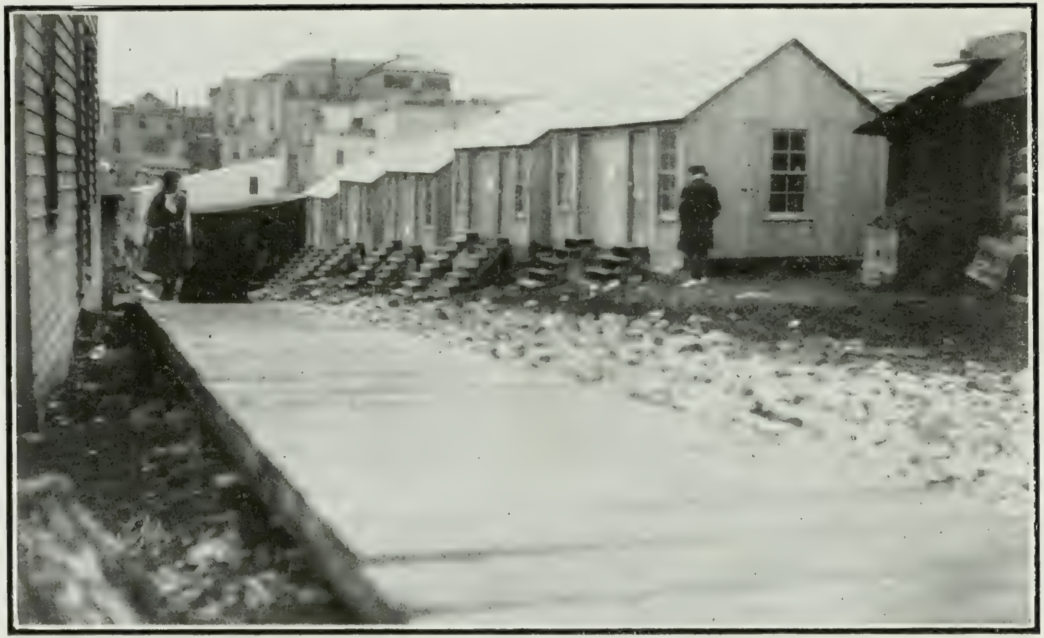
At the Northland Mining Company at Rib Lake, where a number of cases of fever had occurred, they had been using water out of James Lake, a shallow water with decomposed vegetable matter in the bottom. Since taking water from Granite and Rib Lakes and cleaning up the premises, the fever has disappeared.

All of which is respectfully submitted.

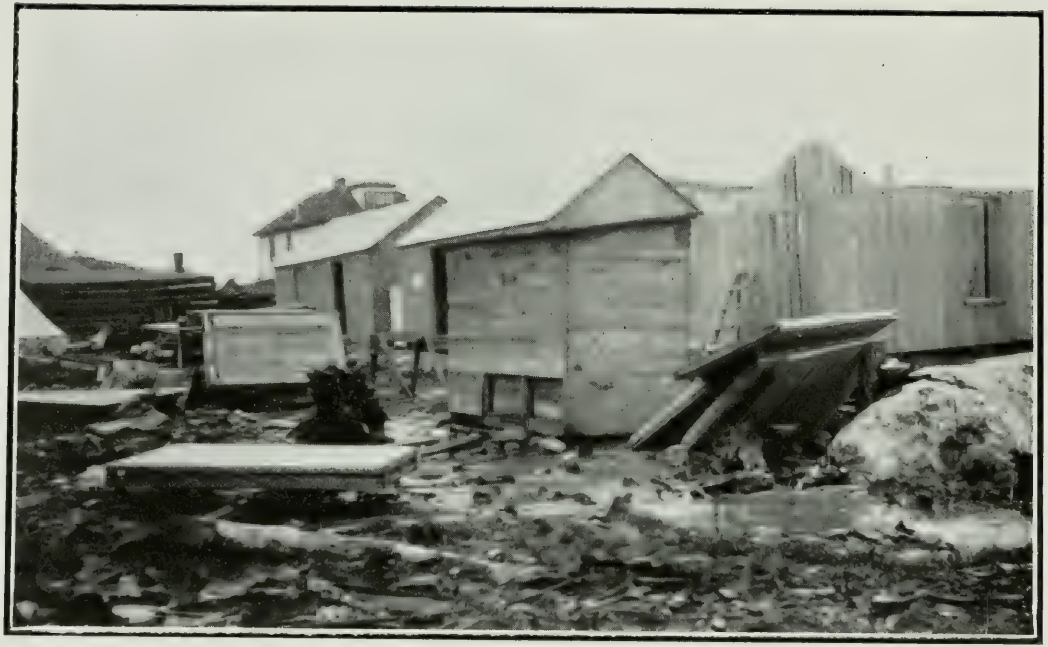
Yours respectfully,

Geo. E. Young,
Inspector, Provincial Board of Health.

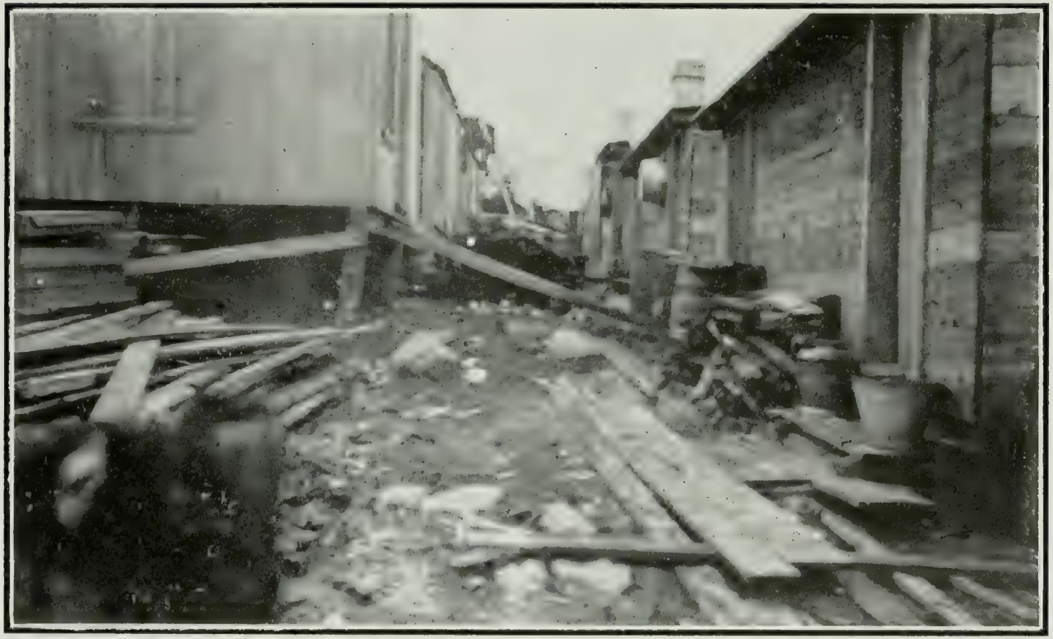
Oct. 31, 1909.



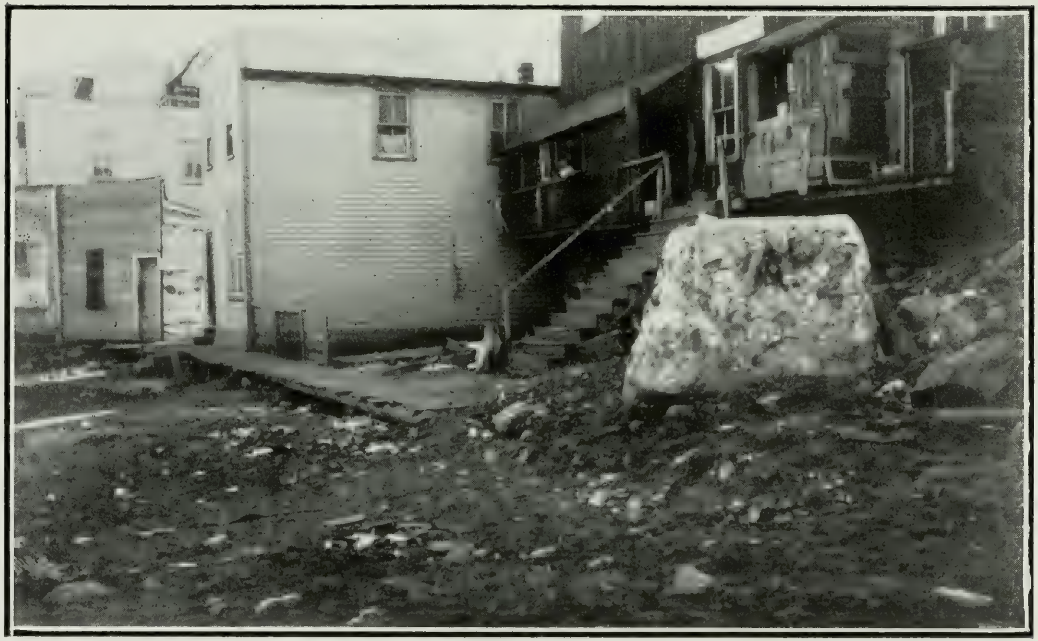
Cobalt. Hunter's Row of Cottages.



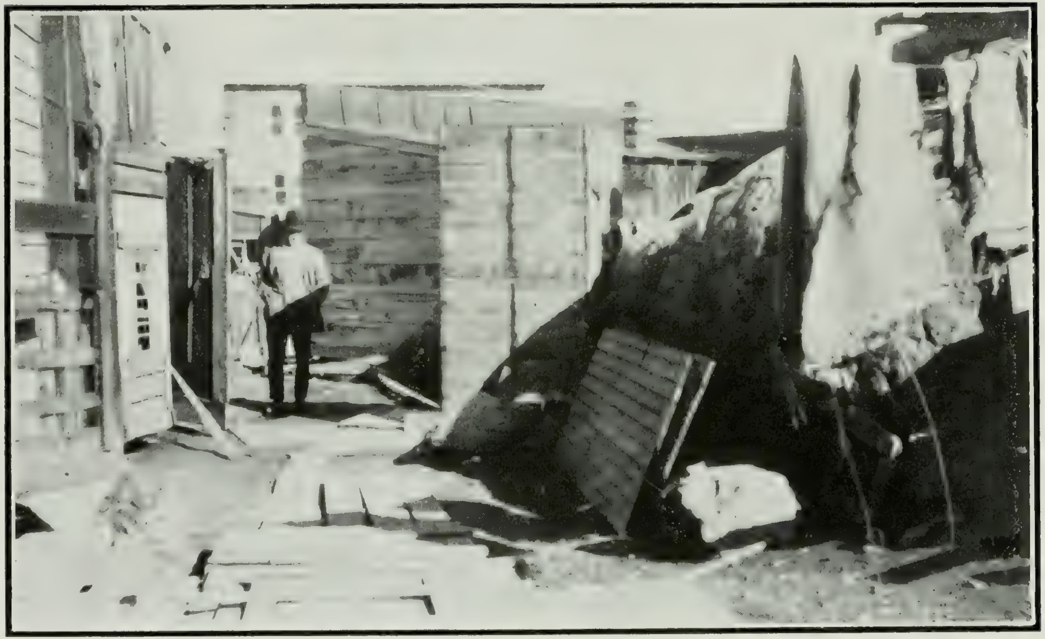
Cobalt. Rear of Hunter's Cottages.



Cobalt. Rear of Hunter's Cottages.



Cobalt. Front of Chinese Rooming House.



Cobalt. Well House of Packing Cases.

Report of the Toronto Laboratories of the Board

John A. Amyot, M.B., Bacteriologist. G. G. Nasmith, B.Sc., Chemist.

The following is the report on the work done in the Laboratory of the Provincial Board of Health, situated at Toronto, during the twelve months ending December 31st, 1909.

There were examined in all 5,479 specimens; of these
981 were swabs from cases of suspected diphtheria,
1,526 were sputa from cases of suspected tuberculosis,
1,299 were bloods from cases of suspected typhoid fever,
1,197 were water samples,
476 were miscellaneous substances.

5,479

The work of the laboratory and its staff has been very various during these months. A noteworthy investigation was carried on with reference to the ozone plant at Lindsay. The report of this was presented to you at your last meeting. The printers have not yet finished with it. It has, however, got to the proof stage, and will probably be out very soon. It does not affect ozone treatment of water as a tried thing. It deals only with the condition found at Lindsay.

During these months also the experimental plant in Stanley Park, Toronto, for the investigation of water purification problems and sewage disposal, has been got finally into running order. So far, what has been done was of a tentative nature. However, we have been able to show that Lake Ontario water is filterable in a perfectly satisfactory manner. Very high rates can be got with great efficiency from both a physical and a bacteriological standpoint, and just at the present time we are prepared to start the serious work of the plant. We are looking forward to producing results as to water filtration by the slow sand method at various rates, to disinfect water with chlorine. We have a series of sewage sprinklers of a new type to experiment with; we have a series of bacterial tanks and sewage aerators ready to commence with, now that we have, finally, succeeded in being able to lift sewage from the large Garrison Creek trunk sewer.

During the past year we have been able to further test the efficiency of the disposal plants established at Innerkip and Colborne for the disposal of troublesome cheese factory waste at these places, and though these plants are not perfect, they, from a practical standpoint, have done all that could be desired. The nuisances that formerly existed at these places in the shape of bad odors, swarms of flies and the pollution of the small streams below have disappeared.

Also a device has been outlined by which the disinfection of railway cars can be successfully accomplished, also a method of the ridding of the same of vermin. Both of these I beg to present to you with this report.

The laboratory has been made use of by other departments of the service in some of the following ways:

A considerable number of liquor specimens have been examined for the

Table shows the number of specimens examined for the various counties of the Province during the past twelve months, and the results in the first three routine denominations as to whether positive or negative.

Report from Laboratory of Provincial Board of Health for the Year 1909.

County.	Diphtheritic Swabs.				Tuberculous Sputa.		Typhoid Bloods.		Miscellaneous Specimens.	Waters.		Total Number for Year.
	Release.		Diagnosis.							Chemical.	Bacterial.	
	+		+	−	+	−	+	−				
Algoma			6	5	7	10	1	3	2	3	24	61
Brant			1	1	8	9		5			2	26
Bruce	2	12	2	2	8	28		18	1		13	86
Carleton					2	11	10	45		2	70	140
Dufferin				4	4	9		11	5		2	35
Elgin			1	4	3	9		2			1	20
Essex	2	4	30	12	17	72	2	40			51	230
Frontenac											5	5
Grey	10	7	14	30	27	43	3	17	6		15	172
Haldimand					3	20	3	9	2		8	45
Haliburton				1	1	5		1				8
Halton	2		2	19	9	16	2	4			17	71
Hastings			2	4	12	21	4	8			24	75
Huron			2	13	5	23	1	20	1		26	91
Kent			2	1	11	40	1	14			8	77
Lambton			2	5	14	17	3	13	1		16	71
Lanark						2		1			5	8
Leeds and Grenvill											6	6
Lincoln			4	10	2	6	1	11	1		19	54
Middlesex			1		1	7	4	8			44	65
Muskoka			6	11	5	22	1	5	1		7	58
Nipissing			4	6	4	5		7	9		57	92
Norfolk		1	8	5	1	12	3	9	3		10	52
Northumberland and Durham			7	4	14	23	1	9			31	89
Ontario				2	5	8	1	2	1	1	2	32
Oxford			4	3	10	40	5	36	16		16	130
Parry Sound			2	6	1	15	3	16			36	79
Peel				3	2	3		4			9	21
Perth			2	1	6	9	2	14	5		12	51
Peterborough			1	3	5	11	1	4	70		29	124
Prescott and Russell			6	2	1	6	1	12				28
Rainy River				3		5			18		3	29
Renfrew		7	5	6	14	33	1	10	6		113	195
Simcoe	1		8	13	16	58	6	45			69	216
Stormont, Dundas and Glengarry			2	7	1	6	2	1			1	20
Thunder Bay		2	1	2	4	5		7	44		47	112
Victoria	1	1	3	23	3	13	1	12	9	2	62	130
Waterloo	1	1	12	16	13	57	3	21	1		19	144
Welland		4	18	11	11	19	7	35	2		40	147
Wellington	1	2	9	14	9	32	3	20	2		33	125
Wentworh	17	14	6	17	3	12		9	3		10	91
York	25	41	198	327	150	346	84	380	532	6	215	2,304

License Department, so many in fact that it has taken the whole time of one man to put the specimens through.

Soaps and disinfectants for the use in the Charities Branches have been examined and reported upon.

For the Game and Fisheries Department, factory wastes have been investigated as to their effects on fish, and waters have been analysed to see if they were suited for use in certain fish hatcheries about to be established.

For the Militia Department a series of water analyses have been made in investigations of water supplies to the London, Niagara and Petawawa Camps.

Special examinations were made for Ottawa, Pembroke and London in reference to water supply conditions there.

The analyses of water samples from Byng Inlet, where some three or four years ago a slow sand filter was established after a series of uninterrupted yearly outbreaks of typhoid fever had existed, have been continued. Typhoid has there been driven out. The only cases they have now are those brought in from the camps to the Hospital to be treated. None have arisen in the town since the establishment of this filter.

The routine examinations of swabs for the Mimico Industrial School have been continued. Up to three years ago continued outbreaks of diphtheria took place in this school. In swab investigation it was found that nearly 50 per cent. of the boys, especially those showing irritated nares and chronic throat irritation, were carrying typical diphtheria bacilli. During one whole summer by a process of separation and repeated taking of swabs it was possible to bring the infected ones down very materially. It was then recommended to the authorities by the medical officers of the Board to hold every newcomer apart until it was shown by duplicated swabs that he was not a carrier of diphtheria bacilli, before being permitted to go into the school. Those cases showing typical or suspicious organisms were held until their absence was shown on repeated swabs. There have only been sporadic cases, and very few have developed since this has been done. No outbreaks as of old have taken place since this method was adopted.

During the past months, at the permission of the Hon. Mr. Hanna, bacteriological and chemical analyses of milk have been carried on for the Milk Commission of the Academy of Medicine, Toronto, with the object of procuring certified milk. Three firms in consequence of the help and coaching have finally been able to produce a milk that comes up to all the strictest requirements of the Commission. Monthly or more frequent examinations are made. Often milk containing not more than 500 bacteria per cubic centimeter has been brought to the laboratory. Only on two or three occasions have samples gone over the 5,000 for winter and 10,000 for summer requirement. In the case of one producer the count has never been above 2,000 per c.c.

Regular monthly analyses have been made of the effluent of the various sections of the Toronto sewage disposal plant at the Woodbine.

THE DISPOSAL OF CHEESE FACTORY WASTE.

A considerable amount of putrescible organic matter is daily to be got rid of by cheese factories. In some cases for want of drainage facilities it is allowed to accumulate about the factory, in others it is discharged into streams to drag its filthy course sometimes a considerable distance below. This is unsanitary. In consequence of the bad odors engendered and the filthy surroundings the factory hands become careless, the milk is not handled in a cleanly manner, the milk producers get into slovenly ways and produce dirty milk. Flies are encouraged about the place (often they swarm). If the discharge is into a stream the water below is contaminated and is not good for man or beast.

In order to decide on the most representative factory in the east and in the west of easy access and to study the problems involved, factories in five districts, the Niagara, the Woodstock, the Stratford, the Colborne, and the Campbellford districts were visited to the number of twenty-five. These factories varied in size from those capable of handling 5,000 lbs. of milk a day to those with facilities to handle 30,000 lbs. a day. Thanks to the untiring energy and enthusiasm of the dairy instructors these factories were almost invariably in very fair sanitary conditions. On all hands those who know would tell you that the chief improvement had been during the last few years, and yet one could frequently locate the factory by the characteristic odor of the whey tank and the accompanying dirty areas.

The quantity of water used for cleansing in the various factories was great or small, not in proportion to the quantity of milk handled but to the quantity of water available.

Most of the factories were situated well away from habitations. But many of them were a nuisance at greater or less distances on account of the pollution of the ditch or stream receiving the waste.

Much fat runs off with the water, and this takes a long time to purify and sticks to much on its way down, and gives rise to very foul odors. In the summer time when the streams are low, the small quantity of water used is not sufficient to dilute the waste or to flush it away.

Every cheese factory visited was provided with a steam boiler for power, for sterilizing and for hot water.

To realize the problems involved one should follow the process of manufacture. After the curd in the vats has sufficiently formed and reached the necessary acidity, the whey is strained off. In most factories this flows over the floors and back into the drains to the whey tanks, carrying with it any dirt that lies on the general floor of the factory. Many of these are of cement and well constructed and drained to a sump to be pumped or run directly into the whey tanks. Some are of wood and well caulked and swollen by being kept moist, and drain off well to the tank. Some are defective, and the whey runs under the floors and all about, resulting in filthy conditions. The whey tanks are often too small, the pipes leading to them are too often defective and leak, so that soaking of the ground in the neighbourhood is common, and when putrefaction takes place a nuisance results. Flies are encouraged and are a great source of danger and annoyance. In the springtime when the farmers are busy and are short of pigs to feed and the roads are bad, the whey is not carried away for two or three days at a time; then also on Monday morning, when the Sunday as well as the Monday milk is done, overflow into the neighbouring watercourses becomes necessary, with the consequent nuisance. After the curds are transferred to the sinks for turning over and draining, the vats are flushed out onto the floors, the floors are flushed off. In most places this is run off into the watercourses and constitutes the greater part of the sewage of the factory. The only legitimate reason for not putting it all into the whey tank is that the water quantity would dilute the whey too much and thus reduce its food value, but beyond its flavor there is comparatively little foodstuff in it in any case. There is an objection to carrying water by horse-power back to the farms. To object to it on account of the dirt on the floor is hardly reasonable, for the first whey rids the floor almost completely of dirt.

The curds are now rarely washed in the process of manufacture. During the various turn-overs they receive, more whey and much fat runs away. This all goes to the whey tank. During the pressing of the curds more whey but very much fat is squeezed out. In some factories this fat is made into butter and realizes a fine bit of pin-money for the cheesemaker. The rest of it reaches the whey tank. Then all the utensils are washed up usually just with hot water, and this water run away to the tank or into the watercourse.

The towels, head cloths and large sheets used are washed in water with the aid of some cleansing compound. This water now becomes sewage, so that we have whey, diluted whey, dirty water and wash-water to deal with.

Much by-product could be saved. From the dripping from the presses much good butter might be made. When the whey is collected without floor washing, the fat might very profitably be collected and rendered into very useful oil. It has been suggested by some that it be separated by the centrifuge and made into butter. When the whey is to be used for food the feeders might object to this diversion of the fat.

In small factories when the least amount of water possible is used, for washing, and in large factories when only the first washing is to dilute the whey *all should be run into the whey-tank and all used as food.* The dilution would be negligible. The extra amount of dirt is only the slightest since most has been washed in by the first flood of whey. In some factories the whey is carried away in barrels, in others it is carried back to the farm in the milk cans. This is the only legitimate reason for separating the washings from the whey. A far more serious objection to using the cans is the carrying of infections, of bitter yeasts, objectionable bacteria, and pathogenic ones from the mixture in the common tank to all of the farms, for it is very rare that the washing of the cans themselves is very efficient, not to speak of sterilization of them before putting the new milk in. The factory then runs the risk of turning out defective cheese, and the disease of one farm is carried to the others. All of these objections could be quite easily overcome, as has been done at the Innerkip factory, by heating the whey in the tank up to about 175° F. with exhaust steam from the engine or by steam directly from the boiler. Not much is required, and a few perforated pipes in whey tanks to let the steam into the whey is all that is needed. The advantages are these: The spread of infection is checked, the whey is brought home hot (an advantage in feeding), the hogs are saved the possibility of developing tuberculosis until such times as the formidable machinery that will be necessary to fight tuberculosis in cattle can be got going. At Innerkip the only complaint from the farmers is on Monday morning when the Sunday and Monday milk is run through and therefore not all sterilized. Again, diarrhœas have diminished perceptibly in the whey-fed hogs since this heating has been done. The cans are much more easily washed than before. In this particular factory they would not willingly go back to the non-sterilizing days.

This draining of nearly all into the whey tank would leave for disposal in small plants, the cloth-washing water only. This could easily (it is only 20 or 30 gallons at most) be distributed at one spot and another on the grounds of the factory at a fair distance from the factory.

In those factories using much water the case is different. If the waste is not to become a nuisance it must be treated.

The proteid material in it is not difficult to handle: the sugars are not, but the fat which is in a finely divided emulsion presents a good deal of difficulty. Retention in storage for 48 or 72 hours, and the putrefaction that takes place will separate much of the fat, allowing it to rise to the surface. But this longer time even is not wholly sufficient, for putrefaction takes place slowly.

Longer retention means expensive tankage. In both of these factories we have tried a 48 hours retention, and to favor the reactions as much as possible we have taken advantage of as many of the possible favoring conditions that we could. The tanks are divided into several communicating compartments by baffle boards, so that everything that will fall to the bottom will remain there and all that will float will be held, the outlet being so placed that it will empty from the fluid between the sediment and the scum.

Sandy land was available in both places (one made, the other natural). This was used for intermittent land treatment, but by subsurface irrigation so as to avoid the encouragement of flies, the unsightly appearance and the odors of putrefaction.

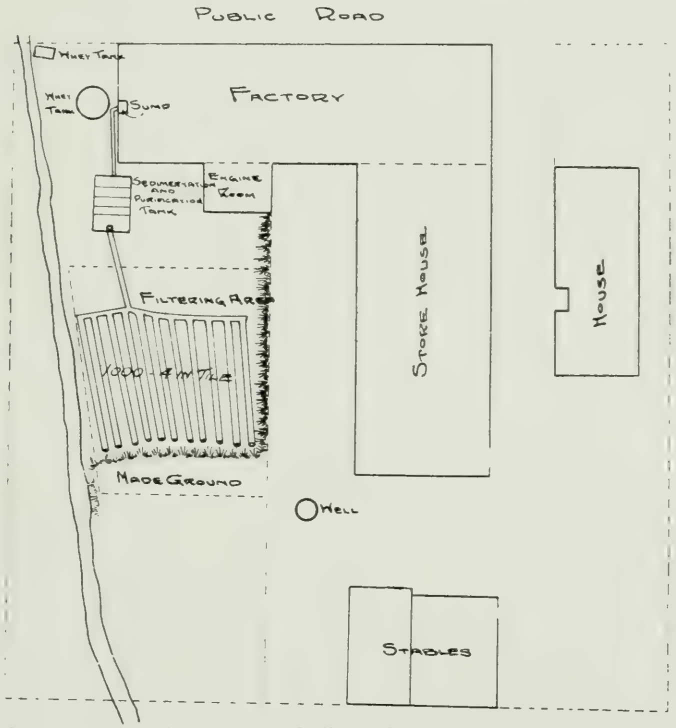
Both plants have given satisfaction. There have been no nuisances about either factory. That specific cheese factory odor has disappeared from both localities. During the last two years the flies have been a considerable nuisance in other localities. In these two factories they have practically been absent, and whereas before very legitimate complaint was made about the streams below, no nuisance exists in this regard.

The same type of plant has been installed at each of the factories selected.

These plants consist each of a concrete elongated compartmental retention reservoir or tank of a size sufficient to hold two average days' discharge. From the retention tank the now partially-treated whey passes to a discharge reservoir (or flush chamber). This "flush chamber" is of a capacity sufficient to hold one half day's quantity of sewage. It is provided with a float indicating when this level is reached. A hand valve is provided to liberate the fluid. The next part of the plant is an "Intermittent land filtration bed." (The land in both cases is of a very porous sandy character, through which fluid drains away quickly.) This is of a size corresponding to the quantity of sewage to be treated, taking such land to be able to treat such tank effluent at the rate of approximately 25,000 gallons per acre per day. The sewage is not poured onto the surface of this area, for of necessity the areas are within a hundred feet of the factories. If the discharge was made on the surface, odors and unsightliness would obtain, and besides flies would probably be attracted in large numbers. To avoid all this we have placed garden tile subsurfacelly in rows some two feet apart over the whole area. We have used four-inch tile (ordinary field tile). These approximately hold one-half gallon each. The number then required for one half day's supply is easily calculated out.

Now whatever is left of the sewage after going through this plant into the nearby stream is practically pure water.

The long retention, adopted in these plants in the sedimentation tanks, was done with the idea of encouraging all the sedimentation possible and all the separation of floating material, especially fat that could be done within practicability. Whey, when undergoing putrefaction gives rise to a considerable quantity of acid, especially if it is so confined that the acid does not get away. This acid is a considerable inhibitor of ordinary putrefactive bacterial activity, so that time must be called upon to help out. By the putrefaction which takes place, the emulsion

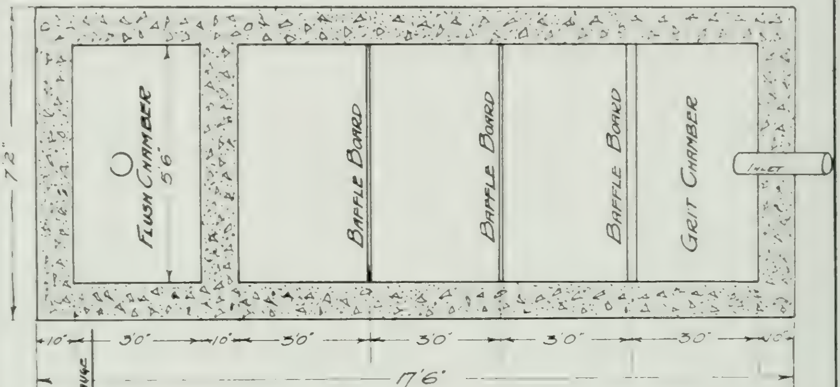


INNERKIP CHEESE FACTORY

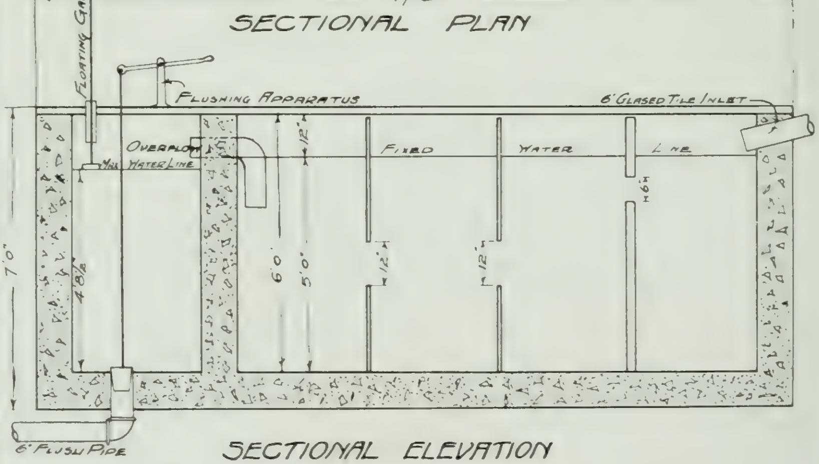
WASTE TREATMENT EXPERIMENT

INNERKIP ONT

SEDIMENTATION AND PURIFICATION TANK



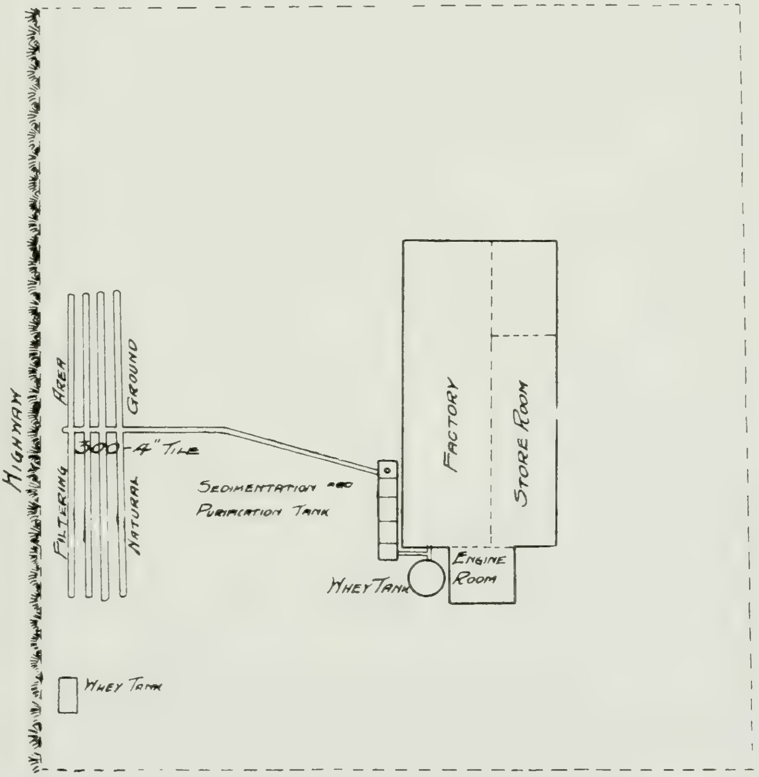
SECTIONAL PLAN



SECTIONAL ELEVATION

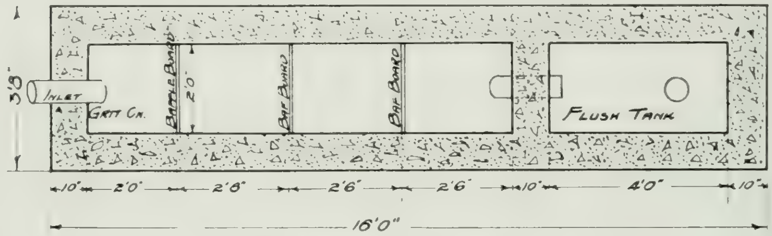
COLBORNE CHEESE FACTORY

WASTE TREATMENT EXPERIMENT

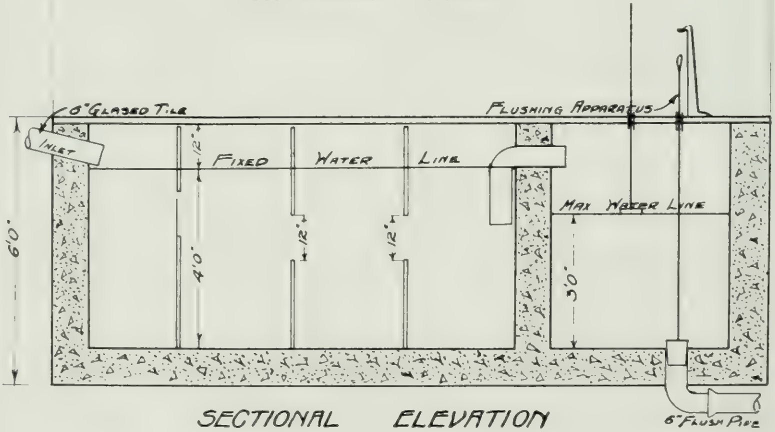


COLBORNE ONT

SEDIMENTATION AND PURIFICATION TANK



SECTIONAL PLAN



SECTIONAL ELEVATION

sustaining nitrogenous material is decomposed, thus liberating the fat. This then floats to the surface. With larger tank capacity and dilution much could be done to encourage this process, but then one gets into expensive tank construction, and cheese factories cannot go to the expense this would entail.

DETAILED DESCRIPTION OF THE INNERKIP PLANT.

The daily discharge of waste at this plant averages 1,000 gallons.

The tank proper is 12 feet by 5 feet 6 inches by 5 feet in depth and calculated to hold approximately 2,000 gallons, so as to give a two days' retention.

The flush tank or chamber at the end of the former tank is of a size sufficient to hold 500 gallons. To indicate this to the factory operators a float is provided. A hand valve is provided whereby the collected effluent may be discharged. The valve consists of a tapering heavy lead stopper fitting into a concrete ring and is operated by a handle from the top of the tank. It has worked very well. On account of its softness it fits very snugly. We did not adopt a copper automatic valve in fear of the action of the considerable quantity of lactic and other acids in the effluent.

One thousand four-inch field tile were placed in rows two feet apart to receive the now half treated sewage, and thus distribute it evenly over the whole area so that each portion would do its share in the final disposal. It is quite admitted that the bed is overworked, but it is only for five months in the year that the plant is required to be in operation. The rest during the next six or seven months is expected to restore its efficiency, and the experience of the last two winters has sustained this expectation.

The tile is buried under 10 or 12 inches of a very sandy soil, which in this case had to be hauled from a distance to make the bed. The soil in the immediate vicinity of the factory where the sewage could be conducted by gravity was heavy clay and not suitable for this sort of work.

The plans 1 and 2 will show in detail the construction of this plant.

DETAILED DESCRIPTION OF THE PLANT AT COLBORNE.

The daily discharge of sewage from this factory is from 200 to 250 gallons.

The sedimentation tank in this case is 9.5 feet by 2 feet by 4 feet in depth inside measurement, and calculated to hold approximately 450 gallons, or two days' discharge.

The flush chamber is constructed like the one at Innerkip, with a capacity of about 150 gallons. The valve and float are the same as at Innerkip.

The subsurface irrigation is carried on through 300 four-inch farm-tile, buried from 10 to 12 inches below the surface in a good, porous, natural soil.

The plans 3 and 4 will show in detail the construction of this plant.

These plants have now been in continuous operation during two seasons.

At the end of each season the first compartment in each had about one foot of scum on the top and about one foot of sludge at the bottom, the next chamber had about six inches of scum and the same of sludge, the next about two inches of scum and the same of sludge; the last chamber had only about one-half inch of scum and about the same of sludge. The effluent passing into the flush chamber was still turbid and contained some suspended matter, but was much less turbid than the fluid in the grit chamber or first compartment.

The odor was bad when the cover was lifted, but was not noticed in the factory, for the vent pipe was carried to above the roof, and escaped high enough up. The scum if rendered down ought to yield quite a quantity of good fat for, say, tannery purposes. The sludge will have to be taken out or buried or disposed overland. It is all organic matter; nevertheless it has not disappeared, as it was once claimed by septic tank promoters would happen. But one cleaning a year is not a hardship. It is localized and not all over the neighbourhood.

No trouble has been experienced with the tile. However they were not without deposit in them. They contained about one-quarter of their capacity of sludge, made up of little pieces of casein and fat chiefly. The earth about the tile was not sludged at all. The inside of the tile was greasy throughout their circumference. This sludge can be cleared out from the flush tank by using two or three quantities of clean water if the ends of the tile rows are opened up. The grease in the pipes can in great part be removed then by flushing with boiling water, thus avoiding the necessity of removing the tile, which we quite expected to have to do every two years at least. Standing over all winter after this was done would about complete the removal of the fats from the inside.

When butter-making is being done there is no sewage being produced necessitating the use of the plant.

At Colborne the results are precisely what were found at Innerkip.

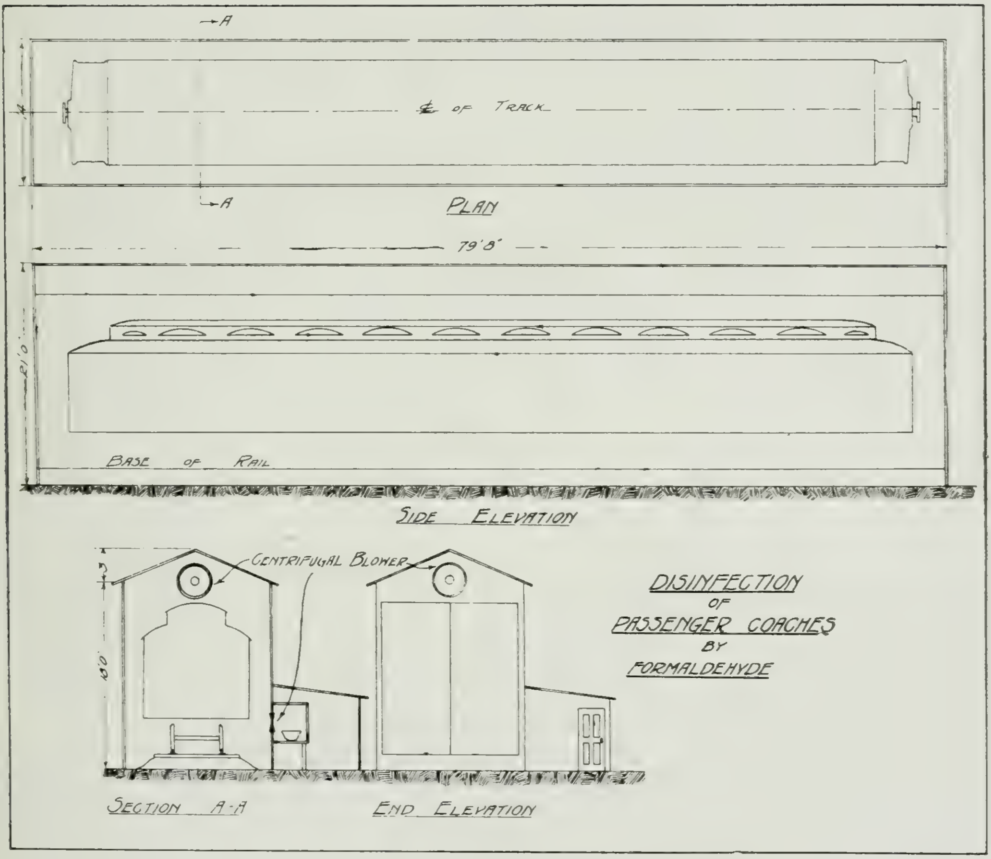
Bacterial treatment in these two cases has not been able to remove all of the organic matter, but has removed much, but with some mechanical aid has given excellent practical results.

From the above the conclusion is justified that when little water is used sewage disposal is not necessary. All of the washing and the whey, if whey tanks enough are provided, should be hauled away to supplement hog feeding. Any infection or ordinary dirt in it can be rendered harmless by a simple sterilization.

The laundry water would be dangerous on account of the alkalies used. This water could be efficiently dealt with on the ground of the neighbourhood, provided it is not discharged on the same spot each time it is thrown out. It is not greater in quantity than the laundry water of an ordinary fair-sized household. If a large quantity of water is used, the whey would be too much diluted. The washings and flushings should be treated. The method employed at Innerkip and at Colborne, though not perfect, would fill the requirements in nearly a perfect manner, at least for all practical purposes.

A Simple Procedure for the Disinfection of Passenger Coaches and to Kill Vermin in Them.

Formaldehyde from commercial formaline is a gas best suited to disinfect aerially rooms and such places. Hydrocyanic acid generated from the decomposition of cyanide of potassium by a mineral acid has proved the most efficient method or material for killing vermin such as fleas, lice, cockroaches, bedbugs and mosquitoes. In order to use these substances efficiently it is necessary that the rooms be so well closed that there is practically no loss of gas, to prevent expense, and most of all to efficiently carry out the disinfection or the insecticidal functions of these. For formaline disinfection proper temperature and a sufficient amount of moisture is required. In passenger coaches, on account of the many windows, doors, ventilators, pipe-openings and various other fixtures, it is next to impossible to make them gas-tight. All of these difficulties could be overcome by placing


→A
℄ OF TRACK
14'
→A
PLAN
79'8"
21'0"
BASE OF RAIL
SIDE ELEVATION
3'
18'0"
CENTRIFUGAL BLOWER
SECTION A-A
END ELEVATION
DISINFECTION
OF
PASSENGER COACHES
BY
FORMALDEHYDE

the car in a practically air-tight house, which can be cheaply built of metal and lined with soldered tin to make it air-tight. This need not be much larger than the ordinary coach. It could be made large enough to receive two or three coaches, if such be desired, and it is not an expensive structure to make. The door only need give any trouble to complete closure. The car or cars placed in this chamber may have all of their doors and windows opened wide. The requisite amount of humidity in the air could be secured by ordinary sprinkling pipes being attached to the sides of the chamber some eight or ten feet from the floor. Water dripping down the wall and down to the floor and left there for fifteen or twenty minutes would very soon bring the air up to the humidity required. The water could be run off to a sump hole, which could very easily be drained over to a sewer. A regulation steam coil would give the required temperature. A chamber at the side of this disinfecting house could be placed in which the formaldehyde could be liberated and then driven by fan into the disinfecting house. The chamber would also serve the purpose of an observation look-in. A couple of small fans in this house could be placed so as to mix the formaldehyde and air uniformly throughout the chamber. The gas could then reach all parts of the exposed bedding, cushioned chairs and seats, the inside and outside of the car and lavatories as well, with the least amount of gas expenditure. The exposure could be made as long as desired. An hour would serve all purposes. The formaldehyde, which is so objectionable in odor, could then be removed very rapidly by a suction fan at one end of the chamber and an inlet fan at the opposite end. Both of these while disinfection is going on can be kept closed to prevent loss of gas.

Now to kill vermin the cyanide of potash could be decomposed in the same chamber as the formaldehyde was liberated from and by the same fan be driven into the fumigating house, and when the half hour's exposure had been complete, could be pushed out and drawn out by the fans mentioned for the extraction of the formaldehyde gas. In this way perfect disinfection and complete insecticidal action could be secured at a minimum cost of apparatus, material and building.

Sewage Effluents examined from July 1st, 1909, to January 1st, 1910.

Town.	Number of Specimens.
Stratford	19
Toronto (Woodbine)	38
Beachville	7
London	4
Total	68

Chemical Waters examined from July 1st, 1909, to January 1st, 1910.

Town.	Number of Specimens.
Ottawa	7
Cobalt	4
Lindsay	18
Parliament Buildings	4
Bowmanville	4
Toronto (Experimental Plant)	44
St. Catharines	3
Burk's Falls	2
Bobcaygeon	1
Berlin	3
Total	90

LIQUORS FROM LICENSE BRANCH FROM JULY 1ST, 1909, TO JANUARY 1ST, 1910.

Laboratory Number.	County.	Alcohol (proof spirit)	Laboratory Number.	County.	Alcohol (proof spirit)
3,240	Algoma	7.08	4,293	Welland	5.94
3,241	"	6.85	4,294	"	71.34
3,242	"	10.86	4,333	Wellington	68.48
3,243	Lambton	1 76	4,334	"	75.88
3,244	"	2.05	4,335	"	72.09
3,402	Owen Sound	.54	4,336	"	73.65
3,403	"	23.64	4,337	"	4.34
3,404	Wellington	1.99	4,400	Oxford	....
3,405	Lambton	30.77	4,529	"	6.57
3,406	"	4.54	4,530	"	.85
3,407	Wentworth	.94	4,531	Nipissing	6.79
3,408	"	1.92	4,532	"	6.74
3,409	"	2.13	4,533	"	1.15
3,410	Lambton	82.42	4,546	"	1.37
3,411	"	7.27	4,547	"	.91
3,479	Nipissing	10.32	4,548	"	.68
3,480	York	none.	4,549	"	1.31
3,481	"	12.35	4,550	Wellington	74.91
3,482	Nipissing	4.65	4,582	Algoma	7.29
3,483	"	4.72	4,583	Nipissing	1.15
3,484	"	3.40	4,587	Grey	1.50
3,485	"	.80	4,632	Simcoe	....
3,486	"	4.60	4,633	"	.59
3,487	"	2.1	4,634	"	2.54
3,488	"	3.62	4,635	"	....
3,489	"	1.20	4,636	"	.94
3,507	Algoma	.91	4,720	"	1.20
3,508	Simcoe	60.72	4,724	Grey	7.97
3,511	York	22.50	4,725	"	7.53
3,615	"	1.47	4,800	"	6.72
3,661	"	none.	4,801	"	7.18
3,662	"	"	4,802	Elgin	5.92
3,663	"	"	4,980	Wellington	75.83
3,664	"	1.69	5,003	Wentworth	.77
3,665	"	1.47	5,004	"	5.73
3,666	"	1.92	5,187	Grey	1.19
3,701	Wellington	19.34	5,195	"	7.79
3,702	"	18.61	5,196	"	8.35
3,703	Wentworth	6.83	5,197	Wellington	77.58
3,704	"	6.5	5,371	York	8.67
3,705	Wellington	7.25	5,380	Haldimand	6.72
3,706	"	none.	5,381	"	1.41
3,707	"	27.	5,391	Lanark	1.38
3,708	"	45.	5,392	"	6.67
3,822	Essex	none.	5,393	"	1.24
3,823	Simcoe	.82	5,613	Algoma	4.92
3,891	Grey	1.06	5,614	Lincoln	6.86
3,892	"	.17	5,615	"	7.22
3,893	"	.21	5,618	"	61.14
3,894	"	.19	5,619	"	38.56
3,895	"	1.52	5,620	"	67.03
4,054	York	13.10	5,621	"	73.67
4,106	Hastings	2.03	5,711	Victoria	1.61
4,007	"	2.38	5,712	"	1.99
4,265	"	7.97	5,713	Simcoe	2.03
4,266	Nipissing	7.81	5,714	"	.47
4,267	"	6.86	5,715	"	....
4,268	"	7.01	5,716	"	2.45
4,269	"	.78	5,734	Nipissing	5.85
4,270	"	1.26	5,735	"	1.85
4,271	"	7.51	5,736	"	1.06
4,272	"	7.5	5,737	"	1.66
4,273	"	6.43	5,738	"	7.01
4,274	"	66.41	5,965	Lambton	1.78
4,292	Welland	11.14	5,966	"	1.13

LIQUORS FROM LICENSE BRANCH FROM JULY 1st. 1909, TO JANUARY 1st. 1910.

Continued

Laboratory Number.	County.	Alcohol (proof spirit)	Laboratory Number.	County.	Alcohol (proof spirit)
5,967	Lambton	1.62	6,406	Nipissing	85
6,023	York	16.40	6,407	"	.85
6,042	"	16.45	6,502	Grey	7.99
6,110	"	7.64	6,503	"	8.02
6,111	Nipissing	5.99	6,663	Brant	2.87
6,173	York	12.61	6,664	"	none
6,215	Renfrew	1.61	6,667	"	2.80
6,231	Bruce	7.78	6,676	Grey	6.65
6,350	Nipissing	.....	6,677	Wentworth	2.52
6,351	"	23.79	6,731	Simcoe	10.76
6,352	"	15.07			

MILK SAMPLES EXAMINED CHEMICALLY FROM JULY 1st, 1909, TO JANUARY 1st, 1910.

Laboratory No.	Specimen number.	Town.	Fat.	Formaldehyde.	Borates.
3,542		Simcoe.	4.25	None.	None.
3,617		Toronto.	3.50	"	"
3,618		"	4.50	"	"
		"	3.00	"	"
		"	2.50	"	"
		"	3.00	"	"
3,788	25	Peterboro.	3.50	"	"
3,789	26	"	3.75	"	"
3,790	27	"	3.50	"	"
3,791	28	"	4.00	"	"
3,792	29	"	3.50	"	"
3,793	30	"	4.00	"	"
3,794	31	"	3.75	"	"
3,795	32	"	3.50	"	"
3,796	33	"	3.75	"	"
3,797	34	"	3.25	"	"
4,032	1	"	4.00	"	"
4,033	2	"	3.50	"	"
4,034	3	"	4.00	"	"
4,035	4	"	4.50	"	"
4,036	5	"	3.75	"	"
4,037	6	"	3.50	"	"
4,038	7	"	4.75	"	"
4,039	8	"	4.00	"	"
4,040	9	"	4 75	"	"
4,041	10	"	4.00	Present.	"
4,042	11	"	4.25	None.	"
4,043	12	"	3.00	"	"
4,217	1	Fort William.	2.5	"	"
4,218	2	"	23.00	"	"
4,219	3	"	16.00	"	"
4,256	1	Cobalt.	2.5	"	"
4,255		Toronto.	3.75	"	"
4,275		"	4.25	"	"
4,276		"	3.25	"	"
4,277		"	3.00	"	"
4,429	26	Peterboro.	3.00	"	"
4,430	27	"	4.00	"	"
4,431	28	"	3.50	"	"
4,432	29	"	4.25	"	"
4,433	30	"	4.75	"	"
4,434	31	"	4.00	"	"
4,435	32	"	4.00	"	"
4,436	33	"	4.00	"	"
4,437	34	"	4.25	"	"
4,438	35	"	3.75	"	"
4,439	36	"	4.00	"	"
4,440	37	"	3.50	"	"
4,675	1	Fort William.	4.00	"	"
4,676	2	"	3.50	"	"
4,677	3	"	4.25	"	"
4,738	1	Kenora.	3.50	"	"
4,739	2	"	4.50	"	"
4,740	3	"	5.00	"	"
4,741	4	"	4.50	"	"
4,742	5	"	3.00	"	"
4,743	6	"	3.75	"	"
4,744	7	"	4.00	"	"
4,745	8	"	4.00	"	"
4,746	9	"	3.25	"	"
4,747	10	"	3.25	"	"
4,748	11	"	4.50	"	"
4,749	12	"	4.75	"	"
4,750	13	"	4.00	"	"

MILK SAMPLES EXAMINED CHEMICALLY FROM JULY 1st, 1909, TO JANUARY 1st, 1910.—*Continued.*

Laboratory No.	Specimen Number.	Town.	Fat.	Formaldehyde.	Borates.
4,751	14	Kenora.	7.00	None.	None.
4,752	15	"	4.00	"	"
4,753	16	"	3.75	"	"
4,754	17	"	4.75	"	"
4,755	18	"	4.00	"	"
4,831	1	Toronto.	4.75	"	"
4,832	2	"	3.75	"	"
4,893	1	"	3.75	"	"
5,061	13	Peterboro.	3.50	"	"
5,062	14	"	3.50	"	"
5,063	15	"	4.00	"	"
5,064	16	"	......	"	"
5,065	17	"	2.75	"	"
5,066	18	"	3.75	"	"
5,067	19	"	3.00	"	"
5,068	20	"	1.50	"	Present.
5,069	21	"	2.75	"	None.
5,070	22	"	2.50	"	"
5,071	23	"	3.00	"	"
5,072	24	"	......	"	"
5,110	1	Fort William.	3.50	"	"
5,111	2	"	2.50	"	"
5,112	3	"	3.50	"	"
5,113	4	"	4.50	"	"
5,114	5	"	3.00	"	"
5,115	6	"	4.00	"	"
5,323	1	Uxbridge.	4.50	"	"
5,448	1	Orangeville.	4.00	"	"
5,554	1	Toronto.	2.50	"	"
5,555		"	3.00	"	"
5,584		"	3.5	"	"
5,999		"	2.75	"	"
6,000		"	2.50	"	"
6,001		"	3.75	"	"
6,116		"	3.00	"	"
6,117		"	3.50	"	"
6,430		"	3.50	"	"
6,431		"	3.00	"	"
6,432		"	4.50	"	"
6,606		"	4.75	"	"

SYNOPSIS OF WORK DONE AT THE KINGSTON BRANCH LABORATORY OF THE PROVINCIAL BOARD OF HEALTH FOR THE TWELVEMONTH ENDING DECEMBER 31st, 1909.

DR. W. T. CONNELL, Assistant Bacteriologist of the Board.

Counties.	Diphtheric Swabs.				Tuberculous Sputa.		Typhoid Bloods.		Miscellaneous Specimens.	Waters.		Total Number for Month.
	Release.		Diagnosis							Chemical.	Bacterial.	
	+	-	+	-	+	−	+	-				
Algoma	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	2
Bruce	.....	.....	.....	.....	3	5	2	....	1	.....	5	16
Carleton	.....	.....	.....	.....	20	29	6	10	.....	.....	6	71
Essex	.....	.....	.....	.....	.....	6	2	.....	.....	.....	.....	8
Frontenac	11	32	28	147	96	227	149	221	110	.....	171	1,192
Haldimand	.....	.....	.....	.....	.....	1	.....	.....	....	.....	1	2
Hastings	.....	.....	4	14	18	32	1	13	5	....	9	96
Lanark	7	14	2	6	3	10	11	3	1	.....	13	70
Leeds and Grenville	3	4	5	18	31	47	34	28	15	.....	106	291
Lennox and Addington	.....	1	4	13	17	44	13	14	7	.....	41	154
Nipissing	.....	.....	.....	.....	.....	4	.....	.....	.....	.....	9	13
Northumberland	.....	.....	1	1	4	10	2	3	3	.....	.....	24
Oxford	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
Parry Sound	.....	.....	.....	.....	1	2	.....	.....	.....	.....	.....	3
Prescott and Russell	.....	1	3	11	8	12	1	1	2	.....	1	40
Peterboro	.....	.....	.....	.....	3	3	.....	.....	3	.....	.....	9
Prince Edward	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Renfrew	4	.....	13	11	22	25	7	4	3	.....	2	91
Simcoe	.....	.....	.....	2	.....	2	27	14	.....	.....	.....	45
Stormont, Dundas and Glengarry	.....	1	2	5	24	43	13	6	8	.....	12	114
Thunder Bay	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	2
Wentworth	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	1	3
	25	53	62	228	253	506	268	317	158	.....	378	2,248

THE LIMITATIONS OF THE DOMESTIC SEPTIC TANK.

By Chas. A. Hodgetts, M.D.

(Read before the Municipal Section of the American Public Health Association.)

During the past decade the so-called septic tank with the surface or subsurface distribution of the sewage effluent has been adopted in many districts of Ontario, and I presume in a similar manner has found a place in many of the States. With us the system was encouraged by some sanitarians, and no doubt in many instances the results have proven very acceptable particularly to the inmates of the home who have been able to indulge in all the luxuries of the bath and toilet which heretofore had only been within the possibilities of the dwellers of a well sewered town or city, while at the same time sewage has been disposed of without creating a nuisance.

But snags have been struck which to the ordinary householder are difficult to understand and are hard for the sanitary officer to explain away—such difficulties as, for instance, the valve getting out of order particularly in the winter season. Then follows the discharge of the sewage through the overflow pipe on to the ground, often at a point adjacent to the house, subsequently trickling into the cellar, thus creating a nuisance and proving injurious to health, and producing conditions which are difficult to remedy in frosty weather: or the frost is unusually severe and the tank freezes when follow conditions similar to those just outlined, or it may be the subsurface pipes at some point in the system become "touched with the frost" when sewage becomes in evidence to both the nose and the eyes: or what is worse yet the land in which the tiles are placed is not of a character as to efficiently work the system and the land becomes sewage soaked, thus creating a serious nuisance and a menace to the health of those living in the immediate vicinity.

These conditions thus briefly outlined sooner or later are self-evident and call for the adoption by the householder of active remedial measures, of course for the sole benefit of himself and family, not to mention his neighbours who are often the greater sufferers, for the tendency of the owner of the system is to drain away from his own premises, in which case it often requires the interference of the local health authorities.

But another more serious danger exists, one which is not so self-evident, and one which it is possibly more difficult to prove as being caused by this or that particular system. It is the pollution of nearby wells; indeed, it may be the well of the owner of a particular system that may be polluted, certainly at various times even if the precaution has been taken to distribute the sewage at a point inferior to his own well, for the underground waters may run in direct variance to the lay of the earth's surface.

It is not, however, the application of the septic tank to the truly rural district to which I desire more particularly to refer, for in my opinion it is to the rural home with its acres of land that the system is more particularly adapted, but even here its installation should not be left to amateurs. In every instance its designing and construction should be carried out by and under a skilled person. Any fool can build a concrete tank to hold the sewage, and he may even lay a given number of tiles, but to work out the question properly requires the engagement of one skilled in this particular work.

I wish to refer particularly to the adoption of this system in small towns and villages, for in my experience it is just here that health authorities should draw the line, and a very hard and fast line, too. Why, only the day this paper was written two persons from different towns in Ontario sought advice in respect to plans for such a system, one where the lot was 40 by 160 feet, and the other a laundry man whose lot was 20 by 150 feet—in both instances the population of each municipality was about 5,000, and in both towns they have waterworks systems and in neither have they a sewerage system because the ratepayers are too mean to install the same. The applicant in the one case was the Chairman of the Local Board of Health who was bemoaning the fact that the town had been halting so long in regard to sewers, and yet he wanted to know if there was not some way they could accommodate the particular ratepayer he represented. I advised him not to permit it, and added—each septic tank and cesspool you have in P— is a spike in the coffin of your sewerage system and a vote against any by-law you may submit.

For local health authorities of any incorporated village or town to sanction the general introduction of the septic tank with subsurface irrigation is, in my opinion, unwarranted, and for sanitary reasons should be condemned. Man is innately selfish when it comes to the disposal of his own domestic sewage. So long as he gets rid of it without in any way endangering the health of himself and family, and without offending their olfactory nerves he is quite content and he will often go to considerable trouble in doing it, but there are others who must be considered in this matter. True, self-preservation in all things is the first law of nature, but under modern environment it is the duty of the health authorities to see that the lives and happiness of "the others" are not endangered, for the resident on the higher land will invariably if left to his own devices drain his filth towards the lower land, which in most instances is not his own, and certainly is away from the family residence.

The objections to these installations in towns and villages, particularly where the chief source of water supply is from wells, are very strong, for contamination of the waters must and does occur by reason of the often general adoption of this system, owing either to the inadequate area of land at the disposal of each householder or the unsuitable character of the soil or the propinquity of the system to surrounding wells.

I have knowledge of a town of some five thousand persons which has a limited public water supply of 100,000 gallons of water daily, where the council has recently refused to carry out the wishes of the ratepayers to install a sewerage system where there are a large number of these private systems operated in clay land, which is far from suitable for the efficient disposal of the effluent, and where in some instances the sewage is very conveniently for the householder run not into septic tanks, but into cesspools sunk into gravelly substrata, and all of these are directly over the water-bearing strata from which the town derives its water supply. Even provided the present number of systems are not exceeded there is no great difficulty in telling what will occur sooner or later. Already this year there have been, I believe, more cases of Enteric Fever reported in this particular town than in any previous year since its incorporation.

It is not with any desire of knocking what in some cases may be a good thing that this short paper is penned, but to direct the attention of the local health authorities to the fact that their use is limited. For farm premises and suburban residences with considerable acreage they are safe to operate provided the soil is suitable and there will be no possibility of pollution of the domestic water supply.

In towns their adoption should be prohibited and all efforts made by the local councils to prevent this creating by the wholesale domestic sewerage systems where there should be installed a general sewerage system with suitable disposal works.

In villages the greatest consideration must be given to ascertaining if all the essentials are present for the successful and proper operating of each individual system before consent is given for its introduction.

CHEMICAL AND GENERAL REPORT ON THE HOWARD-BRIDGE OZONE SYSTEM OF WATER PURIFICATION AS INSTALLED AT LINDSAY, ONTARIO.

By G. G. Nasmith, M.A., Ph.D.,

Chemist of the Provincial Board of Health.

Dear Doctor,—In accordance with the instructions of your Board, we went to Lindsay on October 19th, 1909, equipped a small testing laboratory in a boat house (photograph D), loaned to us by the Water Commissioners, and began making regular chemical and bacterial tests early in November; these tests have been carried out continuously during the months of November, December and January. The bacteriological findings will be found in the accompanying report by Dr. Philp, who made these examinations, while the chemical and general report on the system is herewith submitted.

The original agreement between the town and Mr. J. H. Bridge calls for a water which shall have all taste, odour, colour and harmful bacteria removed (see memorandum), the tests to be made by an expert agreeable to both parties. As a result of this examination made during the summer of 1909, the plant was accepted by the town on the favourable (?) report then received. In the light of the present report this is of peculiar significance.

The water of Lindsay is obtained from the Scugog, a river which flows from Scugog Lake, seven miles above, to Sturgeon Lake, seven miles below. The Scugog is a shallow, mud-bottomed lake, with great weed beds, extensive marshes, and rice fields, well known to the duck hunter. The river banks are low and marshy (photograph A), the river bed itself is full of weeds and expands in places to include large areas of drowned lands with the usual accompaniment of fallen trees and partly submerged stumps.

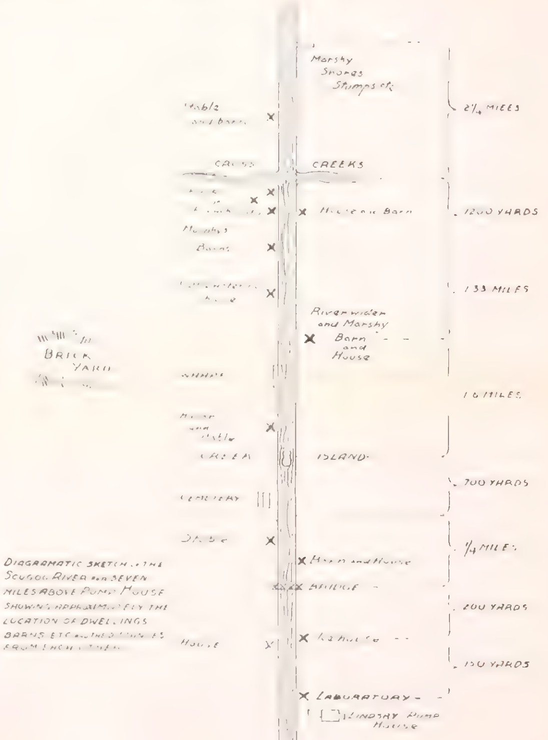
Scugog Lake, situated on the summit of the Oak ridges, is stated to be one of the highest lakes in Ontario and has a very small drainage area. A good deal of the water is said to be derived from springs, a theory which appears to be borne out by the fact that the water is quite hard—200 parts in a million, compared with 125 parts per million in Lake Ontario water.

The banks of the river are bordered by farms, and a considerable number of houses and barns may be seen from the river, none of which, however, are very close to the banks, with the exception of those in the immediate vicinity of the pump house (see sketch). The chances of infection from these should be borne in mind, especially in times of heavy rains and spring thaws; during our three months' test the river was not made turbid once by surface washing.

The proximity of the farms with their barnyards, manured fields and cattle, will readily account for the supply of colon bacilli constantly present in the water (see photograph A).

As one would expect, the water contains large amounts of dissolved organic matter, derived from decaying wood, weeds and other vegetable and animal life; it is highly coloured, contains much visible organic debris and usually tastes "weedy." As one would expect, the bacterial and protozoan flora is quite varied.

The Howard-Bridge plant which has been installed to purify the water consists of two parts: (1) the filters, two in number (photographs B and C), which remove the suspended matters and some of the bacteria from the water, and (2) the ozonizing section for generating and supplying ozone to the filtered water. The



DIAGRAMATIC SKETCH of THE SCUGOG RIVER for SEVEN MILES ABOVE PUMP HOUSE SHOWING APPROXIMATELY THE LOCATION OF DWELLINGS BARNS, ETC and their DISTANCES FROM EACH OTHER.

filters strain the suspended matter from the water: the ozone should literally burn up all the oxidizable matters, including the bacteria, still left in the water, and, when carried to the ultimate conclusion, leave a water free from colour, odour, taste and pathogenic organisms.

Diagram 3 will show at a glance the relationship of the various parts of the plant.

The filters are of the type called rough mechanical filters and are supposed to merely remove the greater part of the suspended matter and clarify the water before submitting it to the principal process of ozonization. No coagulants are used in connection with these filters and the filtered water is usually quite clear.

The round filter has been in use as a roughing filter before the present system was installed: the square filter was added in order to make the filtration more efficient than it had been. The round filter contains 16 inches of Sturgeon Lake sand over 9 inches of gravel; the square filter contains 30 inches of New Jersey sand upon 9 inches of gravel.

These two units filter about half a million gallons of water per day, according to the Water Commissioners' report of the last three years.

The water runs by gravity from the river, a few feet away, into the filters, upon which a head of from one and a half to three feet is maintained, the head depending upon the level of the river. The filtered water is received through Irwin patent sand valves (photograph E), which seemed to have worked very satisfactorily, into pipes which carry it into the filtered water chamber. Here the water flows through the aspirators and is supposed to entangle a sufficient amount of ozone to purify itself.

The apparatus for generating and delivering the ozone (photograph G) is situated in the pump house, and its connections may be gathered from diagrams 1 and 3. In the transformer room there is a blower which is supposed to draw the air from outside and blow it through the ozonizers, two in number, placed in an adjoining air-tight compartment. The current is received at 110 volts and is transformed to 8,000 and 10,000 volts. This current passing through the ozonizer in the form of the "Silent Discharge" transforms the oxygen in the air into the active form of ozone. From this room the ozonized air is led by a six-inch pipe to the aspirators, eight in number, through which the filtered water is flowing (diagrams 2 and 3).

The falling water entangling the ozone carries it down to the bottom of a well, 22 feet deep, and then flows backwards and forwards through a box containing baffles of perforated plates, to the surface of the well. In this travelling together for about 85 feet the ozone is supposed to part with its active atom and destroy the organic matter, including the bacteria, in the water. The water is then pumped from this receiving well into the town mains and standpipe.

The gas generated is without doubt ozone and answers to all the ordinary tests. The smell and physiological effects are quite unlike those of nitrous acid; it is comparatively insoluble in distilled water and samples of the latter saturated with ozone reached the laboratory in Toronto 24 hours afterwards with the strength of the gas apparently undiminished.

I have demonstrated the presence of nitric oxide gases in the ozonized air by aspirating large quantities of the air through ammonia-free distilled water rendered alkaline with potassium hydrate. The amount of nitrogen oxides formed is very small. When we pumped large quantities of ozone through the town water the nitrites and nitrates increased, but largely at the expense of the free and albuminoid ammonia present.

The action of the ozone and filters on the water should be clearly shown by the physical and chemical changes produced in it. Samples were taken from the raw river water as it came into the filters, from the filtered water well, from the ozonized water well and from the town supply, usually from the hotel tap, and analyzed. The following tables speak for themselves.

AVERAGE COMPOSITION OF 7 SERIES OF LINDSAY WATERS. PARTS PER MILLION.

Specimen.	Free NH3.	Albuminoid NH3.	Nitrites and Nitrates.	Total solids.	Total hardness.	Temporary hardness.	Permanent hardness.	Oxygen consumed.	Colour (true).	Chlorine.
Raw.	.022	.238	.129	.0212	195	140	55	5.6	25	1.5
Filtered.	.023	.227	.194	.0212	200	142	58	5.7	25	1.5
Ozonized..	.023	.228	.163	.021	206	140	66	5.6	25	1.5
Tap	.018	.224	.190	.024	202	140	62	5.0	25	1.5

ANALYSIS LINDSAY WATERS IN PARTS PER MILLION.

Raw.

Series.	Free Ammonia.	Albuminoid Ammonia.	Nitrites and Nitrates.	Total solids.	Total hardness.	Temporary hardness.	Permanent hardness.	Oxygen consumed.	Colour.	Chlorine.	Volatile matter.
1	.026	.330	.044	.0175	178.5	130	48.5	......	22	1.00	.0089
2	.045	.325	.020	.0159	168.5	116	52.5	.....	12	1.50	.0035
3	.010	.255	.080	.0215	196.5	131	65.5	5.8	18	2.00	......
4	.020	.135	.020	.0197	163.5	126	37.5	......	25	1.75	......
5	.026	.235	.099	.0189	220.5	149	71.5	......	28	1.75	.. ...
6	.010	.230	.230	.0278	224.5	168	56.5	6.2	35	1.50	.....
7	.020	.160	.410	.0275	213.5	163	50.5	5.0	40	1.50	.. ..

Filtered.

1	.021	.255	.039	.0173	187.5	127	60.5	......	22	1.00	.0077
2	.010	.265	.040	.0162	189.5	117	72.5	.. ...	12	1.50	.0026
3	.027	.270	.250	.0188	186.5	142	44.5	5.6	18	2.00	.....
4	.025	.185	.050	.0176	162.5	128	34.5	.. ...	25	1.75	......
5	.020	.230	.190	.. ...	219.5	153	56.5	......	28	1.75	......
6	.025	200	.235	.0308	237.5	167	70.5	6.5	35	1.50	......
7	.035	.185	.555	.0268	215.5	161	54.5	5.0	38	1.50	... ..

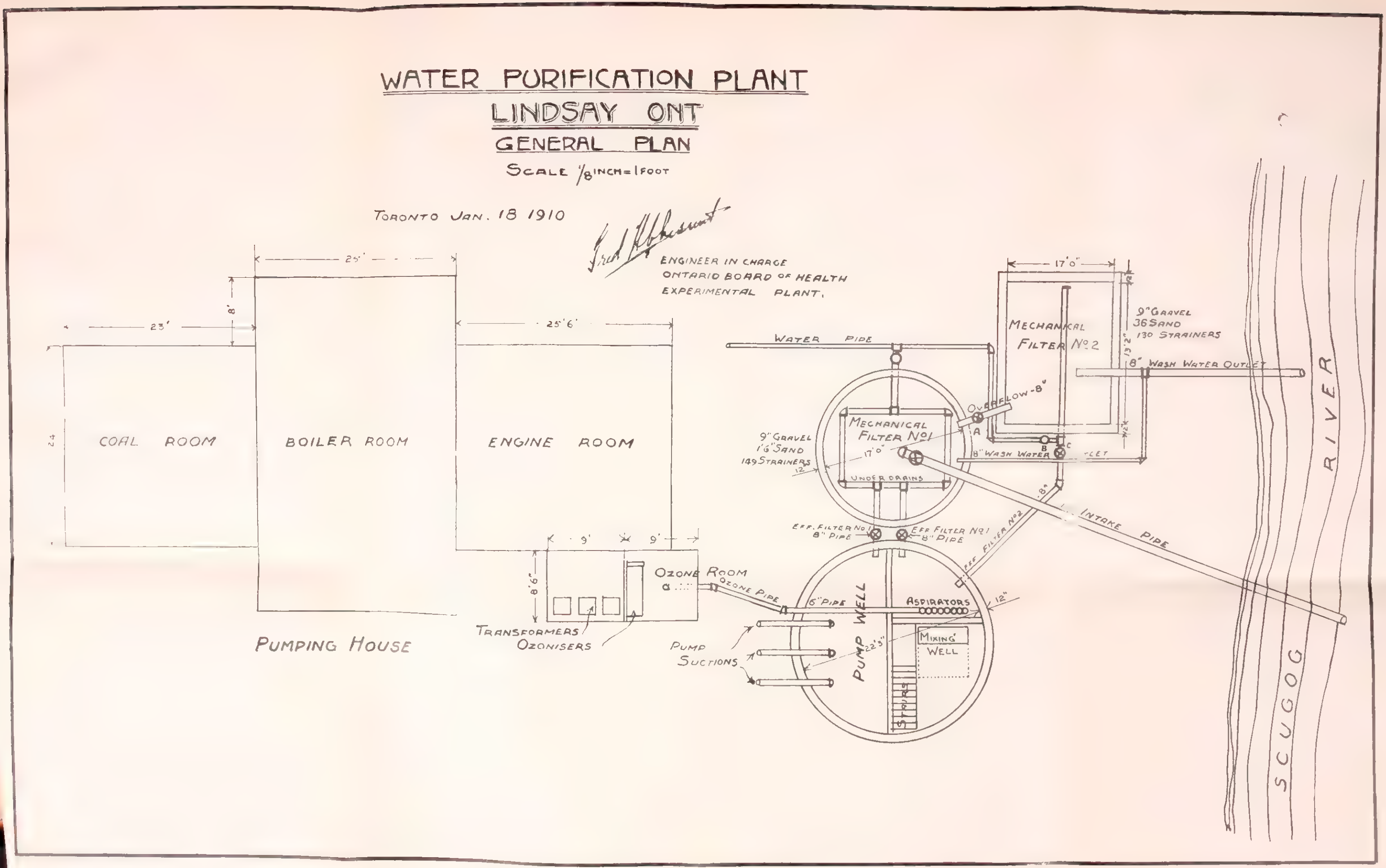

WATER PURIFICATION PLANT
LINDSAY ONT
GENERAL PLAN
SCALE 1/8 INCH = 1 FOOT
TORONTO JAN. 18 1910
ENGINEER IN CHARGE
ONTARIO BOARD OF HEALTH
EXPERIMENTAL PLANT.
25'
8'
23'
25'6"
24
COAL ROOM
BOILER ROOM
ENGINE ROOM
9'
9'
8'6"
OZONE ROOM
TRANSFORMERS
OZONISERS
PUMPING HOUSE
WATER PIPE
MECHANICAL FILTER No 2
17'0"
13'2"
9" GRAVEL
36 SAND
130 STRAINERS
8" WASH WATER OUTLET
OVERFLOW - 8"
A
B
C
MECHANICAL FILTER No 1
9" GRAVEL
1'6" SAND
149 STRAINERS
17'0"
12
UNDER DRAINS
8" WASH WATER OUTLET
8"
INTAKE PIPE
EFF. FILTER No 1 8" PIPE
EFF FILTER No 1 8" PIPE
EFF FILTER No 2
OZONE PIPE
6" PIPE
ASPIRATORS
12"
PUMP WELL
22'3"
MIXING WELL
STAIRS
PUMP SUCTIONS
SCUGOG RIVER

DIAGRAM 1

WATER PURIFICATION PLANT

LINDSAY ONT.

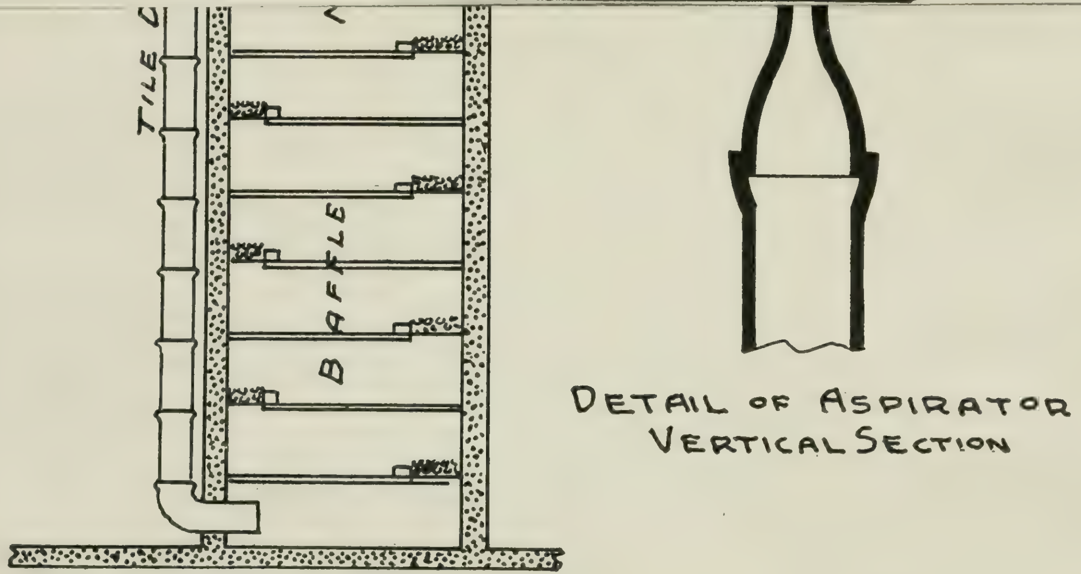


DIAGRAM 2

WATER PURIFICATION PLANT

LINDSAY ONT.

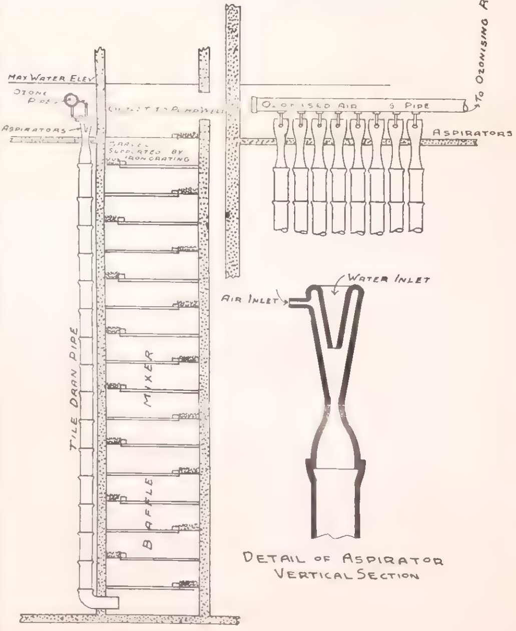
ASPIRATORS AND MIXING WELL

SCALE 1/4 INCH = 1 FOOT

TORONTO JAN 19 1910

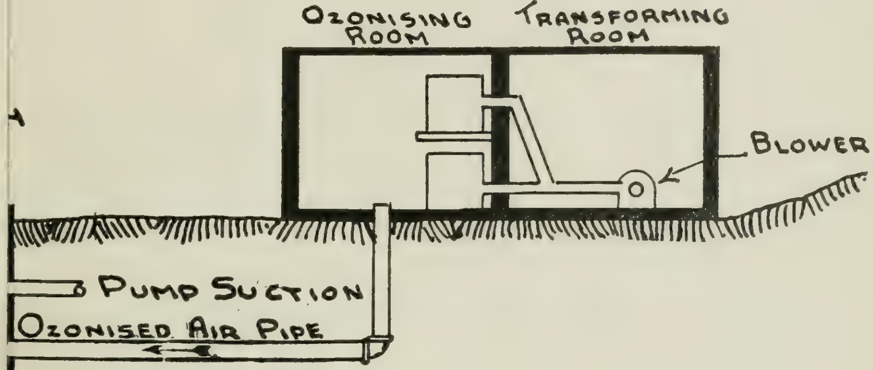
Fred

ENGINEER IN CHARGE
ONTARIO BOARD OF HEALTH
EXPERIMENTAL PLANT



DETAIL OF ASPIRATOR
VERTICAL SECTION

DIAGRAM 2


OZONISING ROOM
TRANSFORMING ROOM
BLOWER
PUMP SUCTION
OZONISED AIR PIPE

WATER PURIFICATION PLANT

LINDSAY ONT.

DIAGRAM SHOWING RELATION OF UNITS

TORONTO JAN 24 1910

Fred
ENGINEER IN CHARGE
ONTARIO BOARD OF HEALTH
EXPERIMENTAL PLANT

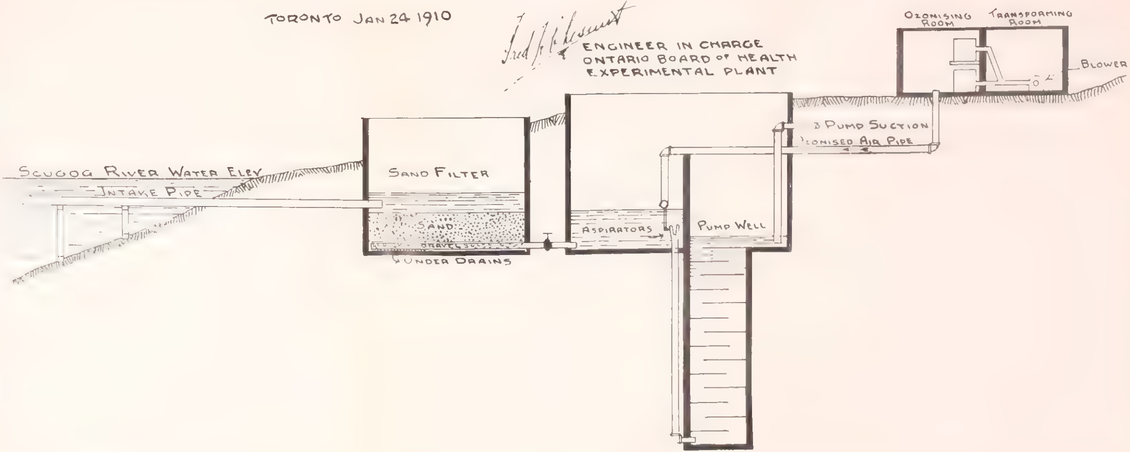


DIAGRAM 3.

ANALYSIS LINDSAY WATERS IN PARTS PER MILLION.—*Continued.*

Ozonized.

1	.036	.280	.029	.0168	181.5	126	55.5	......	22	1.00	.0085
2	.010	.255	.040	.0155	191.5	115	76.5	.. ..	12	1.50	.0043
3	.010	.285	.070	.0196	201.5	132	69.5	6.4	18	2.00	.. ..
4	.060	.120	.030	.0181	170.5	129	41.5	......	25	1.75	......
5	.014	.215	.191	.0188	227.5	154	73.5	......	28	1.75	......
6	.010	.285	.250	.0306	238.5	166	72.5	4.7	35	1.50	......
7	.020	.200	.530	.0281	232.5	161	71.5	5.9	40	1.50	......

Tap.

1	.020	.235	.040	.0165	183.5	135	48.5	......	22	1.00	.0040
2	.012	.255	.053	.0178	186.5	117	69.5	......	12	1.50	.0078
3	.026	.275	.070	.0358	188.5	133	56.5	5.9	18	2.00	.. ..
4	.013	.280	.250	.0196	166.5	123	43.5	.....	25	1.75	.....
5	.020	.235	.190	......	217.5	148	69.5	......	28	1.75	......
6	.020	.140	220	.0281	236.5	165	71.5	5.0	35	1.50	.....
7	.020	.150	.510	.0289	236 5	160	76.5	4.1	40	1.50	.. ..

If the water were being ozonized properly one would expect a decrease in the free ammonia, albuminoid ammonia and oxygen consumed, with a disappearance of the colour and an increase of the nitrites and nitrates from oxidation of the free and albuminoid ammonia. These changes we proved by analysis did take place when we pumped ozone through the town water by means of a force pump.

A glance at the above table will show that the raw, filtered and ozonized water contain the same quantities of free ammonia, and that there are equal amounts of albuminoid ammonia in the filtered and ozonized waters, a small amount having been removed from the raw water by filtration. The nitrites and nitrates ran parallel for the most of the series, but extraordinary variations in two series spoiled the final averages. There is little change in the total solids, hardness or oxygen consumed and the colour and chlorines are unaltered.

From these analyses it will be seen that ozone has done absolutely nothing, not even removing the colour in the slightest degree. The generally accepted idea of the townspeople is that the water has been rendered colourless by their new system. Several laboratory men have been enlisted to compare these waters with the standard water colours and all made readings in harmony with our own. When one looks at the brown water in the river and then at a glass of water from the tap, the latter appears colourless. Two long, colourless glass tubes containing the filtered water before and after it had been ozonized could not be distinguished apart. The first thing that ozone does to a coloured water is to render it colourless; this the Howard-Bridge system has absolutely failed to accomplish, a simple observation which may be made by anybody.

The strength of the ozone was estimated by aspirating twelve litres of the air through an acidified potassium iodide solution and titrating the iodine freed by the standard sodium thiosulphate. The results agreed very well in duplicate but varied in different days and under different conditions. The apparatus for drawing off and estimating the ozone is shown in diagram 3.

Specimens taken from the T pipe just above the aspirators during four different weeks gave an average of .275 grams of ozone per cubic metre of air with the aspirators and blowers working. When the plug was removed from the T pipe, so that the blower could readily drive the air out of the pipe, the air then gave .66 grams of ozone per cubic metre in the single estimation made. Specimens taken directly from the ozone room gave an average of 2.30 grams of ozone per cubic metre. These figures indicate that under ordinary conditions only a part of the ozone is going down the pipe, while it tends to accumulate in the ozone room. On one occasion only the ozone at the T pipe was of about the same strength as that in the ozone room, and then the blower was not in operation.

As it seems to be generally conceded that one cubic metre of water with a low content of organic matter will need at least half a cubic metre of ozone, with a concentration of one-half to one gram of ozone per cubic metre, to purify it, and as it did not seem to me that this quantity could be going into the water, judging from the ebullition on the surface of the ozonizing well, I had a T pipe put in the ozone four feet above the aspirators and tried to measure the flow by a standardized anemometer, at the same time aspirating off samples in order to estimate the strength of ozone. (Photograph F and diagram 4.)

If 500,000 gallons of water per day are flowing through the aspirators with ten hours of pumping then 250,000 gallons of ozonized air per day, or 25,000 gallons per hour, should be drawn through them. This would mean a flow of air at the rate of 340 feet per minute through the six-inch pipe.

As a matter of fact, the movement of air in the pipe was so slight that the anemometer would not turn at all, though the draught passing through the anemometer into an ordinary stove would cause it to revolve rapidly. In other words, the ozone which was being generated was not being drawn into the water. The greater the head of water, of course, the greater the efficiency of any aspirator. The greatest possible head in the well at Lindsay is three feet, which is the difference between the surface of the water over the aspirators and the surface of the water in the sterilizing water well (diagram 3). If this head is maintained, more air is drawn into the aspirators than if the second well is allowed to fill up. As the head becomes less and less, which occurs in practice, because there is no automatic method of regulating the flow, the bubbles coming to the surface may, toward the end, be actually counted.

I endeavoured to obtain the whole quantity of ozone produced in a unit of time by removing the plug in the sterilizing well and allowing the blower to blow away all the ozone into the well as fast as it would be formed.

The anemometer placed in the opening gave the rate of flow, while the strength of the ozone was estimated from the air before it passed through the anemometer. The rate of flow was found in this case to be 1,117 feet per minute with a concentration of .66 grams per cubic metre of air. This gave 4.10 grams of ozone per minute, or 246 grams per hour, flowing through the pipe. In ten hours this would mean a total production of 2,460 grams of ozone.

In 1908, Lindsay used 435,000 gallons of water a day; with the installation of the new system the consumers using the town supply increased, but the recent introduction of meters has again lessened the amount used; the quantity now pumped is probably not far from half a million gallons per diem. According to the pressure gauge on the electric water pump the town is using 600,000 gallons per day, but this seems to be too high. There was sufficient ozone produced, therefore, assuming that 500,000 gallons (equivalent to 2,272 cubic metres) as the maximum capacity of the Lindsay plant, to yield 1.08 grams of ozone for every cubic metre of water to be pumped. At Paderborn, where the water is pure chemically, 1.3 grams of ozone per cubic metre of water are used, while at St. Maur, Paris,

WATER PURIFICATION PLANT

LINDSAY ONT.

APPARATUS FOR ESTIMATING OZONE

TORONTO JAN 18 1910

Fred H

ENGINEER IN CHARGE
ONTARIO BOARD OF HEALTH
EXPERIMENTAL PLANT

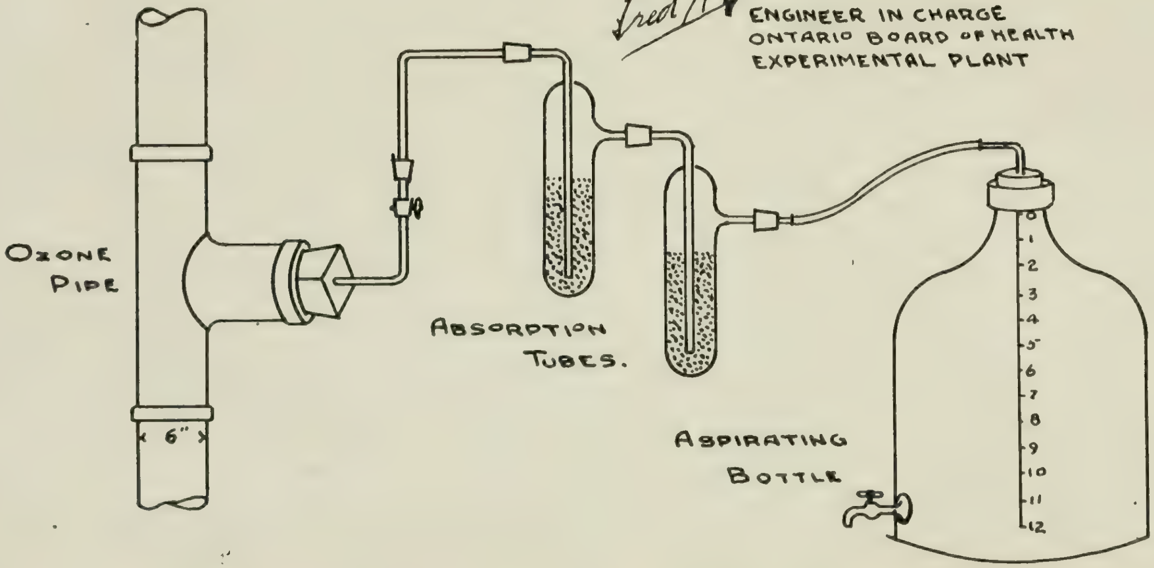


DIAGRAM 4

the amount is only .658 grams of ozone per cubic metre. Since my assistant, as a result of this experiment, was nearly ozonized into another sphere, I did not make any further tests of this nature.

Because the ozone produced was not being removed as rapidly as it was formed, and there was, therefore, no accurate method of estimating the total quantity of ozone produced, it did not seem worth while incurring the expense of a Watt meter for measuring the current used in the ozonizers to obtain the grams of ozone produced per kilowatt hour. The town pays $20 a month for a current sufficient to run the two ozonizers or an eight horse-power motor for the necessary number of hours per day, which would under ordinary circumstances mean the number of pumping hours.

An attempt to determine whether the air would be evenly distributed between the plates of the ozonizers or would merely pass through the central plates in front of the inlet pipes was made by watching the smoke which was blown through them by the blower when the plug was off in the well. The experiment failed because in this case the draught passed back from the well and overcame that from the blower.

This back draught gave us the clue to another feature of this system, namely, the continuous presence of water in the ozonizing room. At first we thought this was due to moisture condensed from the outside air, as a drying system is not part of the plant. With dried air the yield of ozone is greater, the yield of nitric oxides is lessened, and the sparking between the plates is done away with. In the Lindsay plant the moisture condenses on the aluminum plates of the ozonizers as soon as they become cool, and when the current is turned on sparking begins, with the usual accompaniment of short circuiting and burned fuses.

Sometimes when the ozonizers had been off for a couple of hours it would take the engineer in charge half an hour's careful manipulation to get the ozonizers warmed up sufficiently to dissipate the moisture from the plates. During this process as many as five fuses have been burned out.

This water probably comes largely from back draughts of moisture-laden air through the aspirators in the ozonizing well, for as soon as all of the water over the aspirators flows into the next well these are uncovered and a direct connection is established between the air in this well and that in the ozone room.

The evidence all shows that the work of the system at Lindsay falls solely on the filters, which clarify the water and remove 30 per cent. of the bacteria present. A fairly good roughing filter ought to remove 40-50 per cent. of the bacteria present.

One of these filters, the square one, is not watertight. The filters are washed once a week by reversing the curient and allowing it to flow from the town pipes back through the valves in the bottom of the filters (photograph E). This stirs up the sand and washes the dirt out of it: the wash water and dirt are carried off by special pipes into the river. When watching this process one day we noticed as the water rose in the square filter that the three small wells (marked a, b and c on diagram 1) which contain the valves for controlling the inflow and outflow from the square filter rapidly filled with water, which poured down the sides of the wells. This water could only have come through the concrete walls of the filter, since it fell again when the water in the filter fell. During the heavy rains water doubtless flows into this filter from the surrounding earth and may carry in bacteria. These leaks would account for the appearance of oil on the surface of the water in the filters when the ground thawed last spring. Several gallons of the oil had been spilled near the pump house door several months previously.

The covers of the filters and ozonizing wells are not watertight; during every thaw or rain there is a steady drip into these wells capable of contaminating the water even if it had been purified.

The principle underlying any successful sterilization of water by ozone is getting the ozone after it is produced into intimate contact with every drop of water, because of the fact that ozone is comparatively insoluble. This must, therefore, be done by mechanical means, and the apparatus for bringing the ozone and water into intimate contact must be complete in all its details. After ozonization it must be either forced into the water contained in towers, as in the De Fries system, or into towers filled with gravel over which the water is slowly trickling in thin streams, as in the Siemens Halske system. This feature of mechanically forcing the ozone into contact with the water is a heavy item of expense. At St. Maur, Paris, for instance, it costs more than to make the ozone.

There seems to be little doubt, judging by the experiences of Paderborn, Wiesbaden and St. Maur, but that ozone will sterilize water. It simply means perfection of mechanical detail, which in other words is one of cost. For instance, at both Paderborn and Wiesbaden, in Germany, the systems are in duplicate, so that one unit may be operated at a moment's notice when the other fails. Elaborate precautions have been taken to guard against any interruption of the process of purification. Should the electric current fail, or be interrupted in any one of the ozonizers or blower, the supply of water is automatically shut off, an alarum bell begins to ring and an indicator shows exactly where the trouble is located.

To bring the points of failure of the Lindsay system more vividly to mind I will enumerate them in detail.

1. Leaking of the covers on the filters and pure water reservoir.
2. Leaking of the walls of the square filter.
3. Insufficient sand on the round filter.
4. No means for drying the air to be ozonized.
5. Lack of power in the blower.
6. No means for distributing the air evenly through the plates of the ozonizers.
7. Failure of the aspirators to draw into the water any but traces of the ozone produced, as shown by
    - (*a*) No physical changes in the ozonized water.
    - (*b*) No chemical changes in the ozonized water.
    - (*c*) Very slight bacterial reduction in the ozonized water.

From the evidence obtained by us I do not hesitate to say that the Howard-Bridge system, as installed at Lindsay, is an absolute failure as far as purifying the water is concerned. From the mechanical standpoint of the means for carrying to and mixing the ozone with the water it is defective in every particular.

With the knowledge that the ozone does not get into the water the bacterial and chemical results are self-evident, or from the reverse standpoint the bacterial and chemical results are an absolute indication that the ozone is not getting into the water.

The system would achieve practically the same results with the ozonizers shut off or removed. The filters remove 30 per cent. of the bacteria and the ozonizers 8 per cent. more; a fairly good roughing filter should itself remove 40-50 per cent of the bacteria.

I deem it necessary to draw attention to the absolute diversity of these results and those of the report on which the system was accepted by the town. Six months ago colon bacilli were destroyed by the ozone every time; during our test not at all.

At that time the filters removed 75.9 per cent. of the bacteria present in the raw water, while the ozone removed 84.4 per cent., giving a total reduction of 96.2 per cent.* We obtained only 30 per cent. bacterial removal by the filters and 8 per cent. by the ozone, which gave a total reduction of only 35.78 per cent. The mechanism for mixing the ozone and water and the said filters were exactly the same then as now, but the ozonizers are of double the capacity that they were last summer. One would expect the filters to still remove about the same number of bacteria, while the bacteria mortality due to ozone should be much higher.

Under the circumstances it seems reasonable and justifiable to conclude that there must have been some other reason for the differences in the results.

The problem might well be worth investigating by the Water Commissioners of Lindsay.

I am, Sir.

Yours very sincerely,

Geo. G. Nasmith.

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*These are the average reductions of bacteria, calculated from the counts given in the July report, excluding numbers 5 and 9.

BACTERIOLOGICAL REPORT OF THE HOWARD-BRIDGE OZONE SYSTEM OF WATER PURIFICATION, AS INSTALLED AT LINDSAY, ONTARIO.

By Geo. R. Philp, M.B.,

Assistant Bacteriologist of the Provincial Board of Health.

Sir.—I beg to submit the following bacteriological report on the work done in the investigation of the ozone water purification system installed in the town of Lindsay.

The laboratory was fitted up in a boat house near the Pumping Station. The first samples were taken on November 3rd; others were taken thereafter at regular intervals until the end of January. Two or three series were taken daily, each series consisting of water samples from four sources.

(1) The raw river water from the square filter.

(2) The filtered water from the cistern into which the round and square filters drain.

(3) The ozonized sample from the sterilizing well.

(4) The tap water from the faucet in the wash room of the Benson Hotel, and for one week from a similar tap in the Simpson Hotel.

Bacterial counts and fermentation tests were made from each of these samples.

The bacterial counts are expressed in the tables as the number found in each cubic centimetre.

The fermentation results are expressed as positive (+) or negative (—).

The counts were made on standard nutrient agar +10 acid to phenolphthalein after being grown for forty-eight hours at 18°-22° C., .1 c.c. and 1.0 c.c. of water being used.

The fermentation tests were made in saffranin lactose (2 per cent.) nutrient broth + 5 acid to phenolphthalein (neutral to litmus).

These tests were made from quantities of water ranging from 1 c.c.-50 c.c. in the following proportions, viz., 1 c.c., 5 c.c., 10 c.c., 15 c.c., 20 c.c., 30 c.c., 40 c.c., and 50 c.c. They were incubated for forty-eight hours at a temperature of from 37°C. to 40°C.

In tabulating the results of the colon tests, it was noted:

(1) Whether fermentation (F.) had taken place or not, without differentiation of organisms.

(2) Whether there were characteristic colon reactions (C. R.) in addition to the fermentation, such as:

(*a*) Gas fermentation from 5 per cent. to 75 per cent.

(*b*) Reduction of the saffranin from red to a fluorescent canary yellow.

(*c*) Presence of fæcal odour.

(*d*) Acid reaction.

These were tabulated positive (+) or negative (—), according as they fulfilled these four conditions.

For two weeks during January I regularly tested tubes giving the colon reaction (C. R.), selecting them from either the ozonized or tap water, in order to definitely prove the presence or absence of the colon bacillus.

These confirmation tests were carried out in accordance with the standard

RAW RIVER WATER.

ate.	our.	erial No.	1 c.c.		5 c.c.		10 c.c.		15 c.c.		20 c.c.		30 c.c.		40 c.c.		50 c.c.		acteria per c.c. 18°-22° C. Agar+10.	Temperature and Weather Conditions.	Remarks.
				R.		R.		R.		R.		R.		R.		R.		R.			
" 31	10.00	81	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	230	20° F. Clear	
	3.00	82	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	153	23° F. Clear	
1910																					
Jan. 4	10.00	83	−	−	+	−	+	+	+	+	+	+	+	+	+	+	+	+	......	−13° F. Clear, no wind	Count not made.
	3.00	84	−	−	−	−	+	+	+	+	+	+	+	+	+	+	+	+	......	−3° F. Clear	do
" 5	10.30	85	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	......	16° F. Windy, snowing	do
	4.00	86	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	......	32° F. Fine sleet	do
" 6	10.00	87	−	−	−	−	−	−	+	+	+	−	+	+	+	+	+	+	......	21° F. Dull	do
	3.00	88	−	−	−	−	−	−	−	−	+	+	+	+	+	+	+	+	......	22° F. Clear	do
" 7	10.00	89	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	......	27° F. Clear	do
	3.00	90	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	112	25° F. Clear	
" 8	10.00	91	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	143	18° F. Clear	
" 11	10.00	92	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	......	27° F. Somewhat dull	Count not made.
	4.30	93	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	133	30° F. Quiet and dull	
" 12	10.00	94	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	103	31° F. Clear and no wind	
	3.00	95	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	78	29° F. Clear	
" 13	10.00	96	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	......	23° F. Clear	Count not made.
	5.00	97	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	114	20° F. Clear	
" 14	10.00	98	+	+	+	+	−	−	+	+	+	+	+	+	+	+	+	+	......	10° F. Strong east wind	Count not made.
" 18	10.00	99	+	+	+	+	+	+	−	−	+	+	+	+	+	+	+	+	110	39° F. Raining, thawing	
	5.00	100	−	−	+	−	+	+	+	+	+	+	+	+	+	+	+	+	120	34° F. West wind	
" 19	11.00	101	+	−	+	−	+	+	+	+	+	+	+	+	+	+	+	+	......	29° F. Bright and clear	Count not made.
	5.00	102	−	−	−	−	+	+	+	+	+	+	+	+	+	+	+	+	......	24° F. Bright, clear	do
" 20	11.00	103	+	−	+	+	+	+	+	+	+	+	+	+	+	+	+	+	......	37° F. Clear	do
	5.00	104	−	−	+	−	+	+	+	−	+	+	+	+	+	+	+	+	......	35° F. Clear	do
" 21	10.00	105	−	−	+	+	+	+	+	+	+	+	+	+	+	+	+	+	......	34° F. Raining and snowing	do
" 23	11.00	106	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	3,350	29° F. Blowing, but clear	
" 24	11.00	107	+	−	+	+	+	+	+	+	+	+	+	+	+	+	+	+	750	32° F. Clear and bright	
	4 00	108	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	1,170	30° F. Snowing	
" 25	11.00	109	−	−	+	−	+	+	+	+	+	+	+	+	+	+	+	+	590	30° F. Bright	
	3.00	110	−	−	−	−	+	+	+	+	+	+	+	+	+	+	+	+	740	24° F. Bright	
" 26	10.00	111	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	540	26° F. Clear	
" 27	10.00	112	−	−	−	−	+	+	+	+	+	+	+	+	+	+	+	+	240	35° F. Snowing	

F. = Fermentation. C. R. = Colon Reaction.

RAW RIVER WATER

Date	Hour	Serial No.	Bacteria per c.c.	Temperature	Weather Conditions	Remarks
[illegible]						
Nov. 3	1 00	1	2[illegible]	51 F	[illegible] with showers	River [illegible]
" 4	[illegible]	[illegible]	210	50 F	[illegible]	Samples taken from top of square filter
	1 [illegible]	[illegible]	160	44 F	[illegible]	
	4 [illegible]	4	260	[illegible] F	[illegible]	
" [illegible]	10 [illegible]	[illegible]	200	58 F	Fair	
	1[illegible]	6	360	58 F	[illegible]	
		[illegible]	20	43 F	Clear	
" 6	10 [illegible]	[illegible]	60	46 F	[illegible]	
	1[illegible]	[illegible]	[illegible]	48 F	Clear	
	[illegible]	[illegible]	300	58 F	Clear	
" 8	[illegible]		540	51 F	Misty	
	12 [illegible]	[illegible]	2,270	49 F	[illegible]	
	4 [illegible]	[illegible]	[illegible]	45 F	D[illegible]	
" 10	1[illegible]	[illegible]	4,1[illegible]	48 F	[illegible]	
	[illegible]	[illegible]	2,[illegible]00	[illegible] F	[illegible]	
	[illegible]	[illegible]	4,040	[illegible] F	Clear	
" 11	[illegible]	1[illegible]	3,180	[illegible] F	Clear	
	1 [illegible]	[illegible]	2,160	[illegible] F	[illegible]	
" 12	10 00	1	180	57 F	Dull	
	1 00	[illegible]	[illegible]	5[illegible] F	Clear	
	[illegible]	[illegible]	1,930	48 F	Clear	
" 1[illegible]	[illegible]	[illegible]	620	46 F	Clear	
	[illegible]	2[illegible]	1,[illegible]0	4[illegible] F	Clear	
	[illegible]0	[illegible]	1,670	61 F	Bright	
" 17	10 [illegible]	[illegible]	1,076	52 F	Clear	
	1[illegible]	[illegible]	2,620	44 F	Clear	
	[illegible]	[illegible]	750	41 F	[illegible]	
" 1[illegible]	[illegible]	2[illegible]	1,440	[illegible] F	[illegible]	
" 18	10 00	[illegible]	910	[illegible] F	Clear	
	[illegible] 00	31	140	[illegible] F	Clear	No. 2[illegible], Raw, omitted in testing
	[illegible] 00	32	[illegible]0	28 F	Clear	
" 19	1[illegible] 00	[illegible]	[illegible]80	34 F	Clear	
	3 00	34	1,540	[illegible] F	Dull	
" 20	8 00	[illegible]	1,[illegible]60	42.[illegible] F	Dull	
	11 [illegible]	[illegible]	2,[illegible]	47.5 F	Clear	
" 2[illegible]	11 00	[illegible]	[illegible]	[illegible] F	Clear	
	[illegible] 00	[illegible]	1,[illegible]	[illegible] F	Clear	
" 2[illegible]	10 00	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	1,[illegible]	[illegible]	Clear	
" [illegible]	1 [illegible]	[illegible]	1,[illegible]	[illegible]	[illegible]	
	[illegible]		1,[illegible]	[illegible]	[illegible]	
" 2[illegible]	1 [illegible]		2,[illegible]	[illegible]	Clear	
" [illegible]0	10 [illegible]	4[illegible]	1,[illegible]20	[illegible] F	[illegible]	
	12 00	4[illegible]	1,2[illegible]	[illegible]8 F	[illegible]	
	[illegible] 00	46	1,100	34 F	Clear	
Dec. 1	10 00	47	1,[illegible]0	[illegible] F	[illegible]	
	12 00	48	1,410	41 F	[illegible]	
" 2	1 00	49	2,070	41 F	Clear	
" 3	10 00	50	1,1[illegible]0	[illegible] F	Clear [illegible] calm	
	[illegible]	51	1,[illegible]0	34 F	[illegible]	
" 6	[illegible] 00	[illegible]	[illegible]4	[illegible] F	[illegible] snow wind	
" 7	10 [illegible]	[illegible]	5[illegible]	[illegible]2 F	Dull	
	12 [illegible]	54	5[illegible]	[illegible] F	[illegible] snow	
	4 [illegible]	[illegible]	[illegible]	[illegible] F	Wind [illegible]	
" 8	10 00	56	2,100	26 F	Windy	
	3 00	[illegible]	880	17 F	W[illegible]	River [illegible] covered with ice. Trouble with anchor ice at intake
" 9	11 [illegible]	[illegible]8	1,620	[illegible]8 F	Windy	
10	10 00	[illegible]	610	1[illegible] F	Snowing	River frozen over
	[illegible]	60	750	21 F	No wind	
" 11	10 00	61	6[illegible]	16 F	Clear	
	4 00	62	1,1[illegible]	11 F	Clear [illegible] wind	
" 13	11 00	6[illegible]	1,0[illegible]0	[illegible] F	Sleet	
" 14	2 30	64	[illegible]00	32 F	Dull	
" 16	4 30	6[illegible]	[illegible]40	[illegible] F	Clear, snow	
" 17	10 00	66	4[illegible]6	29 F	Snow	
	4 30	6[illegible]	140	0 F	Snow, [illegible] wind	
" 18	11 [illegible]	68	660	[illegible] F	Snowing	
	4 [illegible]	69	2[illegible]	26 F	Snowing	
" 20	12 00	70	150	26 F	[illegible], snow wind	
	1 [illegible]	71	2[illegible]	21 F	Clear	
" 21	1[illegible] 00	72	210	2[illegible] F	Clear	
	4 00	[illegible]	210	1[illegible] F	Clear	
" 22	1[illegible] 00	74	150	26 F	Clear	Plates only
	[illegible] 00	[illegible]	2[illegible]	25 F	Clear	do
" 23	10 [illegible]	[illegible]	[illegible]	24 F	Clear	Plates only, but agar infected, so valueless
" 29	11 [illegible]	77	20[illegible]	0 F	Fine	
	[illegible] 00	78	187	2 F	Fine	
" 30	11 00	79	560	8 F	Fine	
	4 [illegible]	80	400	5 F	Clear	
" [illegible]	[illegible]	[illegible]		[illegible]	[illegible]	
	[illegible]	[illegible]		[illegible]	Clear	
[illegible]						
Jan. 4	10 [illegible]	8[illegible]		1[illegible] F	Clear [illegible] wind	Count not made
	[illegible] 00	84		[illegible] F	Clear	do
" 5	1[illegible]	8[illegible]		16 F	Windy [illegible]	do
	[illegible] 00	86		32 F	[illegible]	do
" 6	[illegible]	8[illegible]		2[illegible] F	Dull	do
	[illegible] 00	88		2[illegible] F	Clear	do
" 7	[illegible] 00	[illegible]		2[illegible] F	Clear	do
	[illegible]	[illegible]0		2[illegible] F	Clear	do
" 8	10 [illegible]	[illegible]	[illegible]12	25 F	Clear	
" 11	[illegible]	[illegible]2	14[illegible]	18 F	Clear	
	[illegible]	[illegible]		27 F	Snow [illegible] fall	Count not made
" 12	10 [illegible]	[illegible]4	1[illegible]	[illegible] F	[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible] F	[illegible]	
" 1[illegible]	10 [illegible]	[illegible]	78	2[illegible] F	Clear	
	[illegible]	[illegible]		[illegible] F	Clear	Count not made
" 14	10 [illegible]	[illegible]	[illegible]4	20 F	Clear	
" 18	10 [illegible]	[illegible]		[illegible] F	[illegible] wind	Count not made
	[illegible]	100	110	[illegible] F	[illegible]	
" 19	11 [illegible]	10[illegible]	20	[illegible] F	Windy	
	5 00	10[illegible]		2[illegible] F	[illegible]	Count not made
" 20	[illegible]	[illegible]		[illegible] F	[illegible]	do
	[illegible]	104		[illegible] F	Clear	do
21	[illegible]	[illegible]		[illegible]	Clear	do
2[illegible]	11 00	10[illegible]		[illegible]	[illegible]	do
" 24	11 00	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	2 F	[illegible]	
" 2[illegible]	11 [illegible]	[illegible]	1,[illegible]	[illegible]	[illegible]	
	[illegible]	1[illegible]	[illegible]	[illegible]	[illegible]	
" 26	[illegible]	1[illegible]	[illegible]40	21 F	[illegible]	
2[illegible]	[illegible]		[illegible]40	[illegible]	Clear	
			[illegible]	[illegible] F	[illegible]	

+ [illegible]

FILTERED WATER.

		No.	1 c.c.		5 c.c.		10 c.c.		15 c.c.		20 c.c.		30 c.c.		40 c.c.		50 c.c.		ria per c.c. -22° C. ar + 10.	Temperature and		Remarks.
	5.00	78	—	—	—	—	+	+	+	+	—	—	+	+	+	+	+	+	145	2° F.	Fine	
“ 30	11.00	79	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	220	8° F.	Fine	
	4.00	80	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	330	−5° F.	Clear	
“ 31	10.00	81	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	202	20° F.	Clear	
	3.00	82	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	115	23° F.	Clear	
, 1910																						
Jan. 4	10.00	83	—	—	+	—	+	+	+	+	+	+	+	+	+	+	+	+	......	−13° F.	Clear, no wind	Filters cleaned Jan. 1st.
	3.00	84	—	—	—	—	+	+	+	+	+	+	+	+	+	+	+	+	210	−3° F.	Clear	
“ 5	10.30	85	+	—	+	+	+	+	+	+	+	+	+	+	+	+	+	+	180	16° F.	Windy, snowing....	
	4.00	86	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	......	32° F.	Fine, sleet.........	Count not made.
“ 6	10.00	87	—	—	—	—	—	—	+	+	+	+	+	+	+	+	+	—	......	21° F.	Dull	do
	3.00	88	—	—	—	—	—	—	+	+	+	+	+	+	+	+	+	+	......	22° F.	Clear	do
“ 7	10.00	89	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	109	27° F.	Clear	
	3.00	90	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	65	25° F.	Clear	
“ 8	10.00	91	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	......	18° F.	Clear	Filters cleaned Jan. 8th.
“ 11	10.00	92	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	.. ...	27° F.	Somewhat dull	Count not made.
	4.30	93	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	106	30° F.	Quiet and dull.....	
“ 12	10.11	94	+	—	+	—	+	+	+	+	+	+	+	+	+	+	+	+	76	31° F.	Clear and no wind..	
	3.00	95	+	—	+	—	+	—	+	+	+	+	+	+	+	+	+	+	56	29° F.	Clear	
“ 13	10.00	96	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	......	23° F.	Clear	Count not made.
	5.00	97	+	—	+	—	+	+	+	+	+	+	+	+	+	+	+	+	76	20° F.	Clear	
“ 14	10.00	98	—	—	+	—	—	—	+	+	+	+	+	+	+	+	+	+	......	10° F.	Strong east wind...	Count not made.
“ 18	10.00	99	+	—	+	—	+	+	+	+	+	+	+	+	+	+	+	+	65	39° F.	Raining, thawing ..	Filters cleaned Jan. 15th.
	5 00	100	—	—	+	—	+	+	+	+	+	+	+	+	+	+	+	+	75	34° F.	West wind.........	
“ 19	11.00	101	+	—	+	—	+	+	+	+	+	+	+	+	+	+	+	+	......	29° F.	Bright and clear..	Count not made.
	5.00	102	—	—	—	—	+	+	+	+	+	+	+	+	+	+	+	+	......	24° F.	Bright, clear......	do
“ 20	11.00	103	+	—	+	+	+	+	+	+	+	+	+	+	+	+	+	+	......	37° F.	Clear	do
	5.00	104	+	—	+	—	+	+	+	+	+	+	+	+	+	+	+	+	......	35° F.	Clear	do
“ 21	10.00	105	—	—	—	—	+	+	+	+	+	+	+	+	+	+	+	+	......	34° F.	Raining and snowing	do
“ 23	11.00	106	+	—	+	+	+	+	+	+	+	+	+	+	+	+	+	+	2,250	29° F.	Blowing, but clear..	Filters cleaned Jan. 22nd.
“ 24	11.00	107	—	—	+	—	+	+	+	+	+	+	+	+	+	+	+	+	600	32° F.	Clear and bright ...	
	4.00	108	+	—	+	+	+	+	+	+	+	+	+	+	+	+	+	+	890	30° F.	Snowing	
“ 25	11.00	109	—	—	—	—	+	+	+	+	+	+	+	+	+	+	+	+	460	30° F.	Bright	
	3,00	110	—	—	—	—	+	+	+	+	+	+	+	+	+	+	+	+	340	24° F.	Bright	
“ 26	10.00	111	+	—	+	—	+	+	+	+	+	+	+	+	+	+	+	+	363	26° F.	Clear	
“ 27	10.00	112	—	—	—	—	+	+	+	+	+	+	+	+	+	+	+	+	185	35° F.	Snowing	

F. = Fermentation. C. R. = Colon Reaction.

FILTERED WATER

Date	Hour	Serial No.	1 c c		5		1 c		1		[illegible]		5		40		30		Bacteria per c. c. at 18–22 C. N. Agar + 10	Temperature and Weather Conditions		Remarks
			F	C R	F	C R	F	C R	F	C R	F	C R	F	C R	F	C R	F	C R				
1909																						
Nov. 3	1.00	1			+										+		+		180	51 F	Dull with showers	
" 4	9.30	2	+		+		+	+	+		+				+			+	140	50 F	[illegible]	
	1.00	3		+	+			+	+		+	+		+		+		+	100	44 F	[illegible]	
	4.30	4			+				+	+		+	+					−	160	59 F	Dull	
" 5	10.00	5			+				+										120	58 F	Fair	
	12.00	6			+				+										210	58 F	Fine and clear	
	[illegible]	7			−												+	+	30	[illegible] F	[illegible]	
" 6	10.00	8					+			+			+				+	+	60	49 F	Clear	
	12.30	9					+		+				+						230	48 F	Clear	
	4.00	10			+		+		−										130	58 F	Clear	Filters cleared late this afternoon
" 8	[illegible]	11	+	+		+	+	+	+								+	+	130	51 F	Misty	
	12.00	12	+		+	+	+		+				+		+		+	+	360	49 F	Dull	
	4.00	13	+	+	+	+	+		+	+									1,070	45 F	Dull	
" 10	10.00	14			+			+	+	+		+	+	+	+	+	+	+	1,480	48 F	Dull	
	12.00	15	+		+	+	+	+	+		+	+	+			+	+		2,410	47 F	Do.	
	[illegible]	16			+				+					+		+		+	1,880	56 F	Clear	
11	9.00	17		+	+		+	+	+	+		+	+	+	+		+		960	65 F	Clear	
	12.00	18			+		+	+	+	+	+	+	+			+	+	+	880	57 F	Dull	
" 12	10.00	19	+	+	+	+		+	+		+	+		+	+			+	620	57 F	Do.	
	12.00	20			+		+		+			+	+		+	+	+	+	480	55 F	Clear	
	4.30	21	+	+			+	+	+	+	+	+	+	+	+	+	+	+	890	48 F	Clear	
" 13	10.00	22			+			+	+	+	+	+	+	+	+	+	+	+	402	46 F	Clear	
	12.00	23			+	+	+		+		+		+	+	+	+		+	1,120	49.5 F	Clear	
	2.30	24	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	1,680	61 F	Bright	Filters cleaned Nov. 13th
" 15	10.00	25	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	980	52 F	Clear	
	12.00	26			+	+	+	+	+	+	+	+	+	+	+	+	+	+	590	44 F	Clear	
	2.30	27	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	240	41 F	Dull	
" 17	12.00	28	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	600	36 F	Blustery	
	5.00	29	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	400	33 F	Some snow	
" 18	10.00	30	+		+	+	+	+	+	+	+	−	+	+	+	+	+	+	730	29 F	Clear	
	3.00	31	+		+		+	+	+	+	+	+	+	+	+	+	+	+	81	31 F	Clear	
	5.00	32	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	90	28 F	Clear	
" 19	10.00	33	+	−	+	+	+	+	+	+	+	+	+	+	+	+	+	+	2,410	34 F	Clear	
	3.00	34	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	1,430	35 F	Dull	
" 20	8.00	35	+		+	+		+	+	+	+	+	+	+	+	+	+	+	2,600	42.5 F	Dull	Filters cleaned Saturday afternoon Nov. 20th
	11.30	36			+	+		+	+	+	+		+	+	+	+	+	+	1,920	47.5 F	Clear	
" 24	11.00	37				+			+			+		+	+			+	1,570	50.5 F	Clear	
	[illegible]	[illegible]							+	+									[illegible]	30 F	Clear	
25	[illegible]	[illegible]	+	+			+		+	+	+	+		+		+			[illegible]	20 F	Clear	
	[illegible]	40	+			+	+	+	+	+	+	+	+	+	+	+	+	+	2,160	25 F	Clear	
" 26	12.00	41			+	−	+	+	+	+	+	+	+	+	+	+	+	+	1,720	[illegible] F	Quite damp	
	3.00	42	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	1,460	[illegible] F	Bright	Filters cleaned Saturday, Nov. 27th.
29	1.00	43	+		+	+	+	+	+	+	+	+	+	+	+	+	+	−	2,790	45.5 F	Clear	
" 30	10.00	44	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	750	39 F	Quite clear	
	12.00	45	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	1,170	38 F	Quiet and clear	
	5.00	46	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	840	34 F	Clear	
Dec. 1	10.00	47		−	+	+	−	−	+	+	+	−	+	+	+	+	+	+	720	37 F	Bright	
	12.00	48	−				+	+	+	+	+	+	+	+	+	+	+	+	890	49 F	Bright	
" 2	1.00	49	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	1,350	41 F	Clear	
" 3	10.00	50	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	570	53 F	Clear and calm	
	3.30	51	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	860	54 F	Clear	Filters cleaned Dec. 4th
" 6	3.00	52		−	−				+	+	+	+	+	+			+	+	370	29 F	Dull and [illegible] wind	
" 7	10.30	53	−				+	+	+	+	+		+	+			+	+	352	32 F	Dull	
	12.30	54	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	421	33 F	Flurry of snow	
	4.30	55					+	+	+		+	+	+	+	+	+	+	+	422	35 F	Windy and sleet	
" 8	10.00	56	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	810	20 F	Windy	
	5.00	57	+	−		+	+	+	+	+	+	+	+	+	+	+	+	+	780	17 F	Windy, snow	
" 9	11.00	58					+	+	+	+	+	+	+	+	+	+	+		960	28 F	Windy	
" 10	10.00	59	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	570	19 F	Snowing	
	5.00	60	+	−		+	+	+	+	+	+	+	+	+		+	+	+	760	21 F	No wind	
" 11	10.00	61	+	+	+		+	+	+	+	+		+	+	+	+	+	+	542	16 F	Clear	
	4.00	62	+		+		+	+	+	−	+	+			+	+	+	+	670	14 F	Clear, no wind	Filters cleaned Dec. 11th.
" 13	11.00	63	+		+		+		+	+	+	+	+	+	+	+	+	+	860	33 F	Sleet	
" 14	9.30	64	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	440	32 F	Dull	
" 16	4.30	65			−		+	+	+		+					−	+	+	270	33 F	Clear, snow	
" 17	10.00	66					+	+	+		+	+	+	+	+	+	+	+	274	29 F	Snow	
	4.30	67					+		+		+		+	+	+	+	+		383	30 F	Snowing hard	
" 18	11.30	68	+		+		+	+	+	+	+		+	+		+	+	+	334	30 F	Snowing	
	4.30	69	+			−			+				+	+		+	+	+	190	26 F	Snowing	Filters cleaned Dec. 18th
" 20	12.00	70			+		+	+	+		+		+	−		+	+		160	26 F	Fair, [illegible] wind	
	4.30	71	+		+		+	+	+		+	+	+	+	+	+	+		225	21 F	Clear	
21	12.00	72	−		+				+			+			+	+	+	+	160	26 F	Clear	
	4.00	73	+	+	+	+		−	+		+		+	+	+	+	+	+	180	15 F	Clear	
" 22	12.00	74							+										190	26 F	Clear	Plates only
	4.00	75																	150	25 F	Clear	do
" 23	10.00	76																		24 F	Clear	Plates only, but agar infected, so of no value
" 24	11.00	77	+	+	+	+	+	+	+		+	+	+	+	+			+	152	0 F	Fine	Filters cleaned Dec. 25th
	[illegible]	[illegible]											+						[illegible]	[illegible]	[illegible]	
	1[illegible]	[illegible]																		[illegible]	[illegible]	
	[illegible]	8[illegible]		+																[illegible]	[illegible]	
31	[illegible]	8[illegible]																	[illegible]	[illegible]	Clear	
	[illegible]	8[illegible]							+		+								11	[illegible]	Clear	
1910																						
Jan. 1	[illegible]	83																+		[illegible] F	Clear	Filters cleaned Jan. 1st
	[illegible]	84					+							+				+	[illegible]	[illegible] F	Clear	
" [illegible]	10[illegible]	85	+		+											+			[illegible]	16 F	W[illegible]	
	4[illegible]	86														+				[illegible] F	[illegible]	
[illegible]	10.00	87											+			+				[illegible] F	[illegible]	Count not made.
	3.00	88														+		+		[illegible] F	Do.	do
[illegible]	1.00	89		+					+	+				+	+	+	+	+	[illegible]	[illegible] F	Clear	do
	[illegible]	90		+		+	+			+		+		+		+		+	[illegible]	[illegible] F	Clear	
8	10.00	91				+		+	−					+		+				18 F	Clear	Filters cleaned Jan. 8th
" 11	10.00	92								+		+		+		+		+		[illegible] F	[illegible]	Count not made
	4.00	93	+	+		+	+					+							[illegible]	[illegible] F	Quiet and dull	
12	10.00	94	+					+		+		+	+		+	+	+	+	[illegible]	[illegible] F	[illegible] wind	
	[illegible]	95					+			+			+			+		+	[illegible]	[illegible] F	Clear	
" 13	[illegible]	96	+				+	+				−		+		+		+		[illegible] F	Clear	Count not made
	[illegible]	97					+	+		+			+		+	+		+	[illegible]	20 F	Clear	
14	[illegible]	98											+	+	+	+		+		16 F	Strong east wind	Count not made
15	[illegible]	99													+	+		+	[illegible]	[illegible] F	[illegible] thawing	Filters cleaned Jan. 15th
	[illegible]	100							+		+			+			+		[illegible]	[illegible] F	West wind	
17	11.00	101							+	+	+									[illegible] F	Bright [illegible]	Count not made
	[illegible]	102													+	+		+		24 F	Bright, clear	do
20	11.00	103	+						+						+			+		[illegible] F	Clear	do
	[illegible]	104						+		+										[illegible] F	Clear	do
21	[illegible]	105					+		+	+	+					−				[illegible] F	[illegible]	do
" 22	1[illegible]	106								+		+		+			−		[illegible]	[illegible] F	[illegible]	Filters cleaned Jan. 22nd
24	1[illegible]	107						+		+							+	+	[illegible]	[illegible] F	Clear and bright	
	4.00	108	+		+	+						+		+					[illegible]	[illegible] F	Snowing	
2[illegible]	11.00	109					+				+								[illegible]	[illegible] F	Bright	
	[illegible]	110						+		+						+			[illegible]	[illegible] F	Bright	
2[illegible]	[illegible]	111																	[illegible]	[illegible] F	Clear	
" 2[illegible]	[illegible]	112		−			+										+		[illegible]	[illegible] F	Snowing	

F Fermentation. C R Color Reaction.

WATER

Date	Hour	No.	Bacteria per c.c. at 18–22° C. Agar 10	Temperature	Weather Conditions	Remarks
			[illegible]	51 F	[illegible]	2 square ozonizers running
			110	55 F	[illegible]	1 square ozonizer running
			[illegible]	44 F	[illegible]	do
			[illegible]	55 F	[illegible]	do
			[illegible]	58 F	Fair	2 square ozonizers running
			140	58 F	Fair and clear	do
			[illegible]	45 F	Clear	do
			[illegible]	49 F	Clear	do
			[illegible]	48 F	Clear	do
			190	58 F	Clear	do
			[illegible]	[illegible]	[illegible]	do
			512	[illegible]	[illegible]	do
			[illegible]	[illegible]	[illegible]	do
10			1,680	48 F	[illegible]	do
			1,180	[illegible]	[illegible]	do
			[illegible]	56 F	Clear	do
11			1,000	65 F	Clear	do
			880	[illegible]	[illegible]	do
			650	57 F	Dull	do
			[illegible]	[illegible]	Clear	do
			1,010	48 F	Clear	do
			[illegible]	46 F	Clear	do
			[illegible]	[illegible]	Clear	do
			670	61 F	Bright	do
			100	52 F	Clear	do
			1,120	51 F	Clear	do
			[illegible]	41 F	[illegible]	do
			420	46 F	[illegible]	do
			110	[illegible]	[illegible]	do
18			440	[illegible]	Clear	do
			[illegible]	51 F	Clear	Ozonizers not running, water taken from sterilizing well
			[illegible]	28 F	Clear	2 square ozonizers working
19	10 00		[illegible]	51 F	Clear	do
			1,460	55 F	[illegible]	do
			[illegible]	[illegible]	[illegible]	do
	11		[illegible]	[illegible]	Clear	do
	11		[illegible]	[illegible]	[illegible]	do
			[illegible]	20 F	Clear	do
			[illegible]	[illegible]	Clear	do
			[illegible]	[illegible]	Clear	do
			500	[illegible]	[illegible]	do
			1,400	[illegible]	[illegible]	do
			[illegible]	[illegible]	Clear	do
	10		[illegible]	26 F	[illegible]	1 oblong ozonizer and 1 square ozonizer working
			1,040	8 F	[illegible]	do
			611	34 F	Clear	do
Dec.	10 00	47	[illegible]	37 F	Bright	1 oblong ozonizer working
		48	930	40 F	Bright	do
	1 00	49	[illegible]	41 F	Clear	2 oblong ozonizers working
	10 00	50	[illegible]	[illegible]	Clear	do
	3 30	51	[illegible]	44 F	Clear	do
6		52	[illegible]	[illegible]	[illegible]	do
7	10 30	53	[illegible]	32 F	[illegible]	do
	12 00	54	[illegible]	[illegible]	[illegible]	do
	4 00	55	[illegible]	[illegible]	Windy and sleet	do
8	10 00	56	[illegible]	40 F	Windy	do
	3 00	57	513	16 F	Windy	do
9	11 00	58	[illegible]	28 F	Windy	do
10	10 00	59	[illegible]	11 F	Snowing	do
	3 00	60	670	[illegible]	[illegible]	do
11	10 00	61	[illegible]	16 F	Clear	do
	4 00	62	[illegible]	14 F	Clear	do
13	11 30	63	610	[illegible]	Sleet	do
14	9 30	64	421	[illegible]	Dull	do
16	4 00	65	[illegible]	[illegible]	Clear	do
17	10 00	66	[illegible]	[illegible]	Snow	do
	4 00	67	[illegible]	30 F	Snowing hard	do
18	11 30	68	[illegible]	30 F	Snowing	do
	4 00	69	[illegible]	26 F	Snowing	2 oblong ozonizers working, blower used
20	12 00	70	150	26 F	[illegible]	2 oblong ozonizers working, no blower
	4 00	71	[illegible]	21 F	Clear	2 oblong ozonizers working, blower used. Cracks in ozone room plastered up
21	12 00	72	150	26 F	Clear	2 oblong ozonizers working, blower used
	4 00	73	[illegible]	[illegible]	Clear	do
22	12 00	74	[illegible]	[illegible]	Clear	Plates only, blower used
	4 00	75	170	[illegible]	Clear	do
23	10 00	76	[illegible]	21 F	Clear	Plates only, but agar overheated, so of no value
	11 00	77	148	[illegible]	Fair	2 oblong ozonizers, blower used
		78	148	[illegible]	[illegible]	do
			[illegible]	[illegible]	[illegible]	do
			[illegible]	[illegible]	Clear	do
31	10 00	81	261	20 F	Clear	do
	3 00	82	140	23 F	Clear	do
1910						
Jan. 4	10 00	83	Countless	[illegible]	Clear, no wind	2 ozonizers but no blower
		84	[illegible]	[illegible]	Clear	do
	11 00	85	[illegible]	10 F	Windy	2 ozonizers and blower used
	4 00	86	[illegible]	[illegible]	[illegible]	do
6		87	[illegible]	21 F	[illegible]	do
		88	[illegible]	[illegible]	Clear	do
7	10 00	89	110	[illegible]	Clear	do
		90	[illegible]	25 F	Clear	do
8	10 00	91	Countless	18 F	Clear	do
11		92	76	[illegible]	[illegible]	2 ozonizers and blower used. Vent, water put in transformer room
	4 00	93	[illegible]	30 F	[illegible]	do
12	10 00	94	[illegible]	31 F	Clear and no wind	do
		95	[illegible]	[illegible]	Clear	2 oblong ozonizers working, blower off
	10 00	96	Countless	[illegible]	Clear	2 oblong ozonizers and blower working
		97	[illegible]	20 F	Clear	do
14	10	98	Countless	10 F	Strong cold wind	do
18			50	[illegible]	[illegible]	do
			70	[illegible]	Windy	do
	11 00		Countless	[illegible]	[illegible]	do
	3 00	102	[illegible]	[illegible]	[illegible]	
	11 00		[illegible]	24 F	Bright and clear	do
			1	[illegible]	Clear	do
21	10 00		1	[illegible]	Clear	do
	11 00		1	34 F	[illegible]	do
			[illegible]	[illegible]	[illegible]	1 oblong ozonizer and blower working
24			[illegible]	[illegible]	Cloudy and bright	do
	4 00		[illegible]	[illegible]	[illegible]	do
			[illegible]	[illegible]	[illegible]	do
			[illegible]	24 F	Bright	do
26	10 00	111	[illegible]	[illegible]	Clear	do
	10 00	112	[illegible]	[illegible]	Snowing	do

F Fermentation C. R. Colon Reaction

TAP WATER.

Date.	Hour.	Serial No.	1 c.c.		5 c.c.		10 c.c.		15 c.c.		20 c.c.		30 c.c.		40 c.c.		50 c.c.		Bacteria per c.c. at 18°-22° C. N. Agar + 10.	Temperature and Weather Conditions.		Remarks.
			F.	C. R.	F.	C. R.	F.	C. R.	F.	C. R.	F.	C. R.	F.	C. R.	F.	C. R.	F.	C. R.				
1909																						
Nov. 3	1.00	1	+	+	+	+	+	−	−	−	+	−	+	+	+	−	+	+	70	51° F.	Dull with	Sample of tap water
7	10.00	89	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	3.00	90	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	76	25° F.	Clear	
" 8	10.00	91	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	100	18° F.	Clear	
" 11	10.00	92	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	104	27° F.	Somewhat dull	
	4.30	93	+	−	+	+	+	−	+	+	+	+	+	+	+	+	+	+	112	30° F.	Quiet and dull.....	
" 12	9.30	94	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	64	31° F.	Clear and no wind..	
	3.00	95	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	47	29° F.	Clear	Tap water taken from Simpson Hotel.
" 13	9.30	96	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Count not made.	23° F.	Clear	do
	3.00	97	+	−	+	−	+	+	+	+	+	+	+	+	+	+	+	+	do	20° F.	Clear	do
" 14	9.30	98	−	−	+	−	+	−	+	−	+	−	+	+	+	+	+	+	do	10° F.	Strong east wind...	do
" 18	9.00	99	−	−	+	−	+	+	−	−	+	+	+	+	+	+	+	+	45	39° F.	Raining, thawing...	do
	3.00	100	−	−	−	−	+	+	+	+	+	+	+	+	+	+	+	+	60	34° F.	West wind	do
" 19	11.00	101	+	−	+	−	+	+	+	+	+	+	+	+	+	+	+	+	Count not made.	29° F.	Bright and clear...	do
	3.00	102	−	−	−	−	+	+	+	+	+	+	+	+	+	+	+	+	do	24° F.	Bright, clear.......	do
" 20	10.00	103	+	−	+	+	+	+	+	+	+	+	+	+	+	+	+	+	do	37° F.	Clear	do
	3.00	104	−	−	−	−	−	−	+	+	+	−	+	+	+	+	+	+	do	35° F.	Clear	do
" 21	9.00	105	−	−	−	−	+	+	+	+	+	+	+	+	+	+	+	+	do	34° F.	Raining, snowing ..	Benson Hotel tap water.
" 23	10.00	106	+	−	+	+	+	+	+	+	+	+	+	+	+	+	+	+	2,200	29° F.	Blowing, but clear.	
" 24	10.00	107	+	−	+	+	+	+	+	+	+	+	+	+	+	+	+	+	2,800	32° F.	Clear and bright ...	
	3.00	108	+	−	+	−	+	+	+	+	+	+	+	+	+	+	+	+	480	30° F.	Snowing..........	
" 25	10.00	109	−	−	−	−	+	+	+	+	+	+	+	+	+	+	+	+	420	30° F.	Bright	
	2.00	110	−	−	−	−	+	+	+	+	+	−	+	−	+	+	+	+	382	24° F.	Bright	
" 26	9.30	111	−	−	−	−	+	+	+	+	+	+	+	+	+	+	+	+	420	26° F.	Clear	

F. = Fermentation. C. R. = Colon Reaction.

Date		Time	No.	[illegible]	Temperature and Weather Conditions		Remarks
[illegible]			1	[illegible]	51 F	[illegible] with showers	Sample of tap water was taken from faucet in wash room of the Benson Hotel.
"	4		[illegible]	100	[illegible] F	[illegible]	
		1 00		112	44 F	[illegible]	do
		3 00		20	8 F	Fair	
		[illegible]	6	52	38 F	[illegible] clear	
"	[illegible]	11 [illegible]	8	80	[illegible] F	Clear	
		1 00	9	110	48 F	Clear	
"	8	[illegible]	11	251	[illegible] F	Misty	
		12 00	12	[illegible]	[illegible] F	[illegible]	
"	10	9 00	14	1,190	48 F	Dull	
		[illegible]	15	1,660	47 F	Dull	
"	11	[illegible]	17	960	[illegible] F	Clear	
"	12	10 [illegible]	[illegible]	560	57 F	[illegible]	
		2 [illegible]	20	600	[illegible] F	Clear	
"	[illegible]	10 00	[illegible]	302	46 F	Clear	
		[illegible]	23	1,650	41.5 F	Clear	
"	[illegible]	10 00	[illegible]	690	52 F	Clear	
		[illegible]	[illegible]	590	44 F	Clear	
"	17	[illegible]	28	470	36 F	Blustery	
"	18	9 00	30	310	29 F	Clear	
		3 00	31	[illegible]	31 F	Clear	
"	19	10 00	33	1,970	34 F	Clear	
		[illegible]	34	1,470	35 F	Dull	
"	20	8 00	35	1,180	[illegible] F	Dull	
"	24	11 00	37	[illegible]	50.5 F	Clear	
		[illegible]	38	[illegible]	20 F	Clear	
"	25	10 00	39	1,820	20 F	Clear	
		3 00	40	2,110	25 F	Clear	
"	26	9 30	41	960	39 F	Quite damp	
		2 30	42	970	49 F	Bright	
"	29	1 30	43	2,670	45.5 F	Clear	
"	30	10 00	44	770	39 F	Quite clear	
		[illegible]	46	620	34 F	Clear	
Dec	1	10 00	47	1,350	37 F	Bright	
"	2	4 00	[illegible]	1,130	41 F	Clear	
"	3	9 30	[illegible]	[illegible]	[illegible] F	Clear [illegible]	
				[illegible]	[illegible] F	Clear	
				[illegible]	[illegible] F	[illegible] wind	
				[illegible]	[illegible] F	Dull	
		2 [illegible]		[illegible]	33 F	Windy and sleet	
"	8	9 30		[illegible]	20 F	Windy	
		[illegible]	[illegible]	[illegible]	17 F	Windy, snow	
"	9	9 30	58	540	28 F	Windy	
"	10	9 30	[illegible]	600	19 F	Snowing	
		[illegible]	60	510	21 F	No wind	
"	11	9 30	61	470	16 F	Clear	
		3 00	62	570	14 F.	Clear no wind	
"	13	9 30	63	690	33 F	Sleet	
"	14	9 30	64	409	32 F	Dull	
"	16	2 00	65	437	33 F	Clear snow	
"	17	10 00	66	230	29 F	Snow	
		4 30	67	380	30 F	Snowing hard	
"	18	9 30	68	211	30 F	Snowing	
		4 30	69	280	26 F	Snowing	
"	20	9 30	70	125	26 F	Fair, [illegible] wind	
		3 00	71	119	21 F	Clear	
"	21	9 30	72	184	26 F	Clear	
		4 00	73	170	15 F	Clear	
"	22	4 00	75	150	25 F	Clear	Plates only
"	29	3 00	78	139	2 F	Fine	
"	30	9 30	79	85	8 F	Fine	
		4 00	80	150	5 F	Clear	
"	31	9 30	81	143	20 F	Clear	
		3 00	82	95	25 F	Clear	
1910							
Jan	4	9 30	83		15 F.	Clear, no wind	Count not made
		2 30	84		−3 F	Clear	do
"	5	10 30	85		16 F	Windy, snowing	do
		4 00	86		32 F	Fine sleet	do
"	6	10 00	87		21 F	Dull	do
		3 00	88		22 F	Clear	do
"	7	10 00	89	[illegible]	[illegible] F	Clear	
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	8	10 [illegible]	[illegible]	[illegible]	[illegible] F	Clear	
"	11	[illegible]	[illegible]	[illegible]	[illegible] F	[illegible]	
		4 [illegible]	[illegible]	[illegible]	0 F	Quiet and [illegible]	
	12	9 30	94	64	[illegible] F	Clear and no wind	
		3 00	[illegible]	[illegible]	29 F	Clear	Tap water taken from Simpson Hotel
"	13	9 30	96	Count not made	23 F	Clear	do
		3 00	97	[illegible]	26 F	Clear	do
"	14	9 30	98	[illegible]	10 F	Strong east wind	do
	18	[illegible]	99	[illegible]	[illegible] F	Raining, thawing	do
		3 00	100	60	34 F	West wind	do
	19	11 00	101	Count not made	[illegible] F	Bright and clear	do
		[illegible]	102	[illegible]	24 F	Bright clear	do
"	20	10 00	103	[illegible]	37 F	Clear	do
		[illegible]	104	[illegible]	[illegible] F	Clear	do
	21	9 00	105	[illegible]	34 F	Raining, snowing	Benson Hotel tap water.
"	23	10 00	106	[illegible]	29 F	Blowing but clear	
	24	10 30	107	2,800	32 F	Clear and bright	
		[illegible]	108	[illegible]	[illegible] F	Snowing	
	27	10 00	[illegible]	[illegible]	[illegible] F	Bright	
		2 [illegible]	[illegible]	[illegible]	34 F	Bright	
	[illegible]	9 [illegible]	[illegible]	[illegible]	26 F	Clear	

F Fermentation [illegible] R [illegible] Reaction methods of the American Public Health Association (Laboratory Section). If the colon bacillus is present the following reactions should be obtained.

(1) Characteristic growth on agar slant.
(2) Absence of liquefaction in gelatine.
(3) Coagulation and acidification of milk with gas formation.
(4) Characteristic motility and morphology.
(5) Gram's stain negative.
(6) Indol reaction.
(7) Organism for above recovered on litmus lactose agar plate as red colony.

These confirmation tests were not made on all the samples because of the difficulty of testing so many cultures. It would have meant proving out 48 to 72 cultures a day according as two or three series were made. This in the nature of the conditions was impossible. These confirmatory tests were made with samples selected at random from those showing positive colon reactions, and proved beyond doubt the presence of colon bacilli. Consequently, I conclude that all the others showing colon reactions (C. R.) contained the colon bacillus.

The following table will show the number of counts made during the test, and the average number of bacteria in each count:

Source of water.	Number of tests.	Average number of bacteria per c.c.
Raw water	190	827
Filtered water	196	577
Ozonized water	194	531
Tap water	194	528

This shows an average reduction due to filtration alone of 30.2 per cent. over the raw water, with an average reduction after passing through the ozone sterilizer of 7.98 per cent. over the filtered water.

The combined reduction of bacteria by filtration and ozonization is 35.78 per cent., while in the tap water the total reduction over the combined filtration and ozonization is an additional 0.56 per cent. A similar reduction is frequently found in other systems in tap water at a distance from the pumping station and has usually been accounted for by sedimentation.

I attach herewith schedules showing:

(1) Detailed results of tests made showing fermentation reactions and bacterial counts.

(2) Summary of average weekly bacterial counts.

(3) Summary giving total number of tests of each water used showing the number of positive and negative fermentations and also the total number of these fermentations which showed positive and negative colon reactions.

I have the honour to be,
Yours respectfully,
GEO. R. PHILP.

DR. HODGETTS,
Chief Health Officer of Ontario,
Toronto.

AVERAGE BACTERIAL COUNTS BY WEEKS.

Week ending.	Number of samples.	Raw.	Filtered.	Ozonized.	Tap.	Percentage Reduction by Filtration.	Percentage Reduction of Bacteria by Ozonization of Filtered Water.	Combined Reduction by Filtration and by Ozonization.
1909.						%	%	%
November 6	10	200	136	97	78	32.0	28.7	51.5
" 13	14	1,943	1,026	1,127	815	47.2	....	43.0
" 20	12	1,450	1,006	956	844	30.6	4.97	34.1
" 27	6	2,286	1,910	1,613	1,852	16.2	15.5	29.4
December 4	9	1,525	1,098	1,061	1,148	28.0	3.4	30.4
" 11	11	910	605	498	461	33.5	17.7	45.2
" 18	7	559	393	353	374	29.7	10.2	36.8
" 25	7	214	174	151	166	14.2	13.2	29.4
1910.								
January 1	6	265	194	175	123	26.8	9.8	34.0
" 8	9	128	87	91	91	32.0	....	28.9
" 15	7	107	79	75	82	26.2	5.06	29.9
" 22	7	115	70	60	53	39.1	14.3	47.8
" 29	7	1,054	727	670	780	31.0	7.84	36.4
Average count of 112 samples		827	577	531	528	30.23	7.97	35.78

0.66% reduction in tap water over ozonized water.

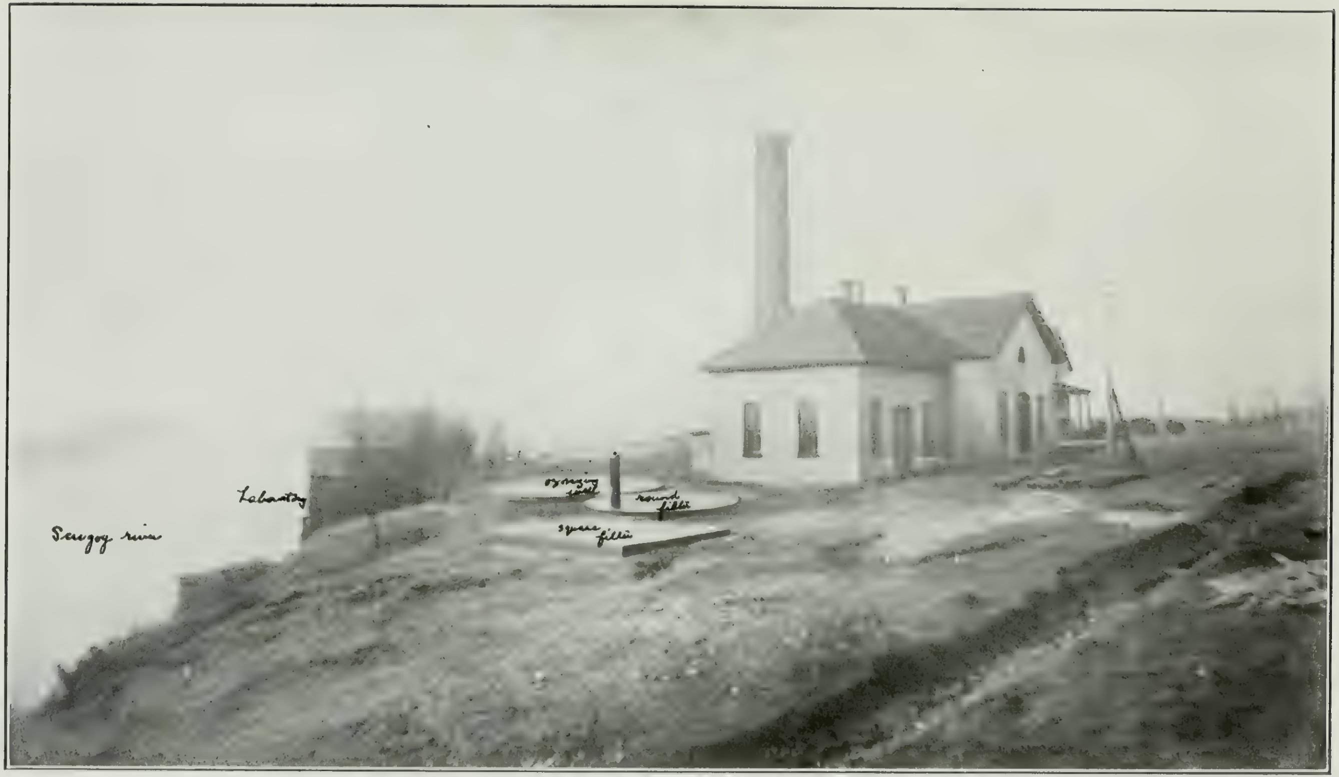
SUMMARY OF FERMENTATION REACTIONS.

Showing number of Positive and Negative Fermentations and Colon Reactions in each of the quantities of the several waters tested.

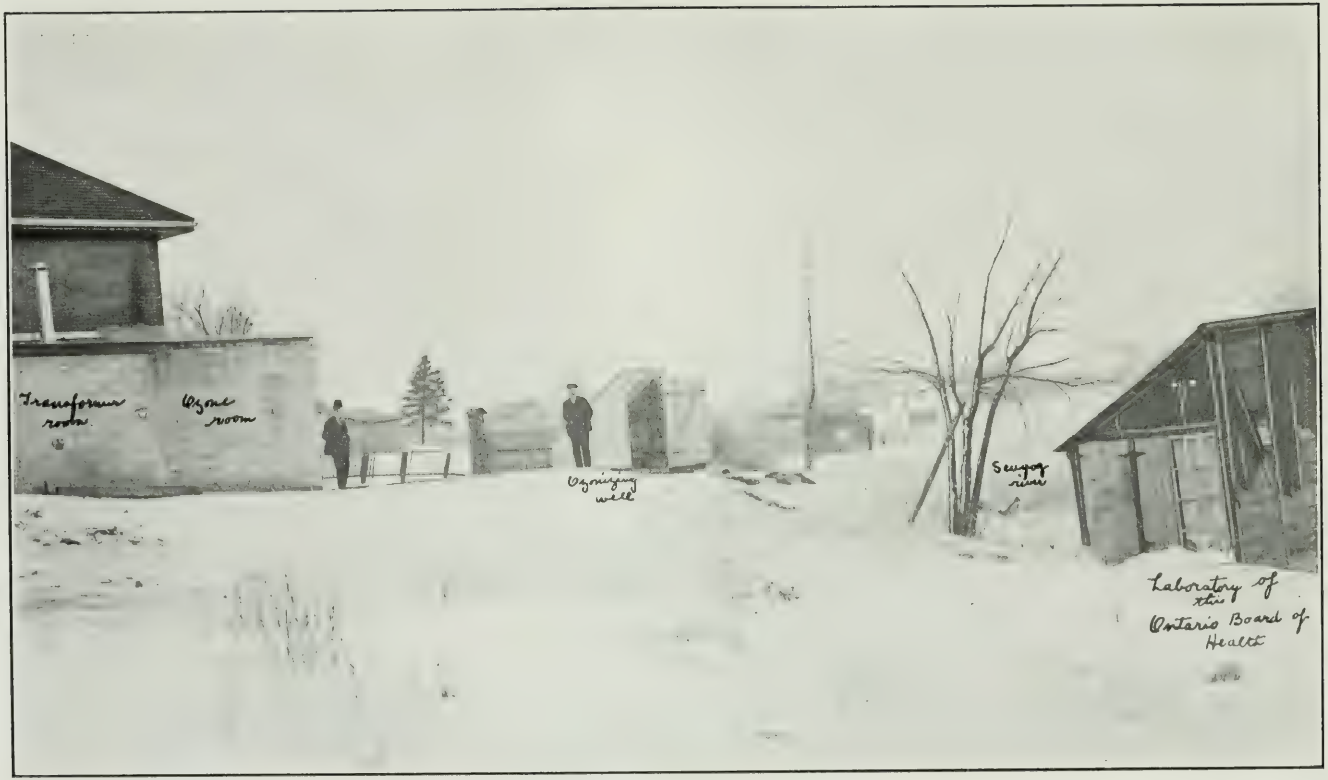
Water.	No. of samples.	1 c.c.				5 c.c.				10 c.c.				15 c.c.				20 c.c.				30 c.c.				40 c.c.				50 c.c.			
		F.		C. R.		F.		C. R.		F.		C. R.		F.		C. R.		F.		C. R.		F.		C. R.		F.		C. R.		F.		C. R.	
		+	−	+		−	+		+		+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+		+	−	+
Raw	108	30	78	43	65	16	92	35	73	7	101	10	98	5	103	9	99	3	105	6	102	2	106	2	106	3	105	4	104	1	107	3	105
Filtered	109	23	86	64	45	21	88	49	60	8	101	15	94	4	105	8	101	3	106	10	99	3	106	8	101	7	102	12	97	2	107	9	100
Ozonized.............	109	34	75	68	41	26	83	52	57	9	100	17	92	6	103	13	96	2	107	11	98	2	107	8	101	2	107	10	99	2	107	10	99
Tap..........	92	29	63	58	34	19	73	45	47	8	84	13	79	5	87	11	81	4	88	10	82	3	89	12	80	2	90	9	83	1	91	5	87

F. Fermentation. C. R. Colon Reaction.

A.—A typical scene on the banks of the Scugog River above the intake of the Lindsay Pumping Station.

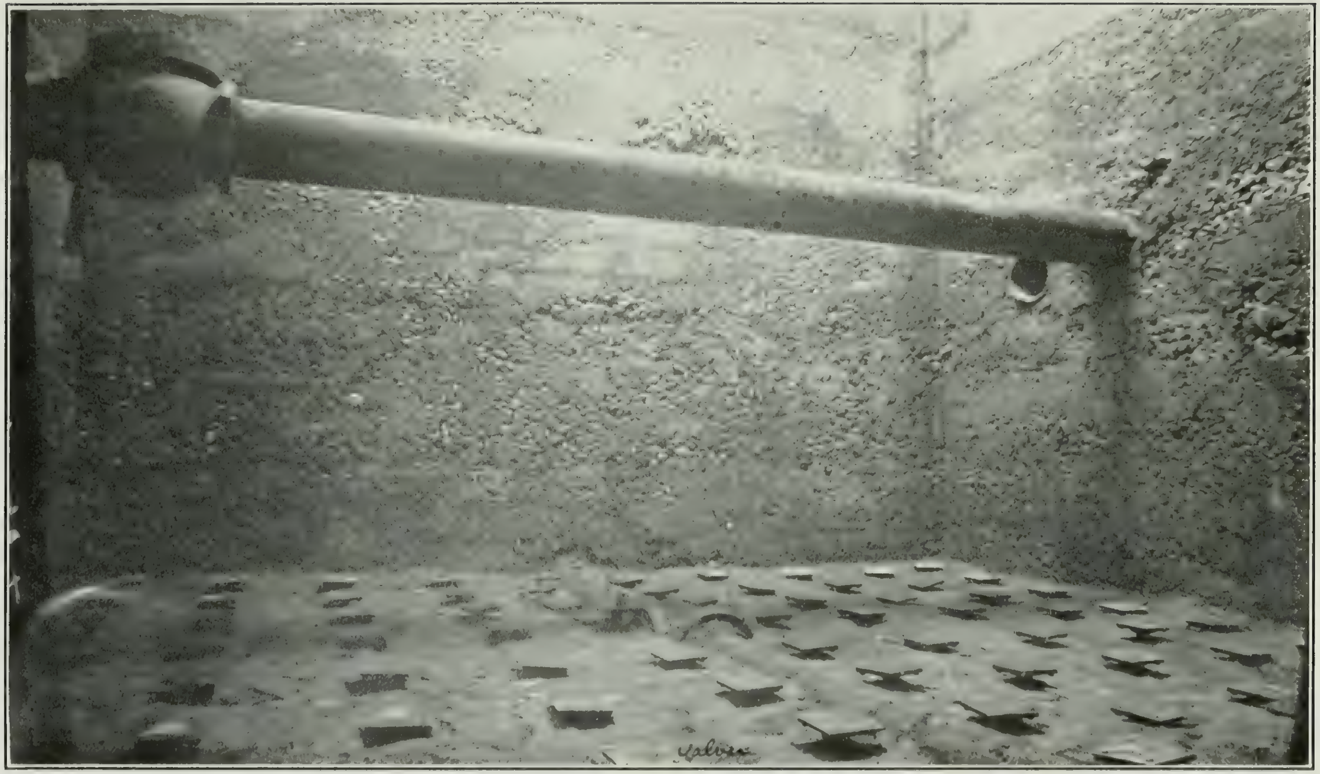


B.—General view of the Lindsay plant looking up the river towards Scugog Lake.

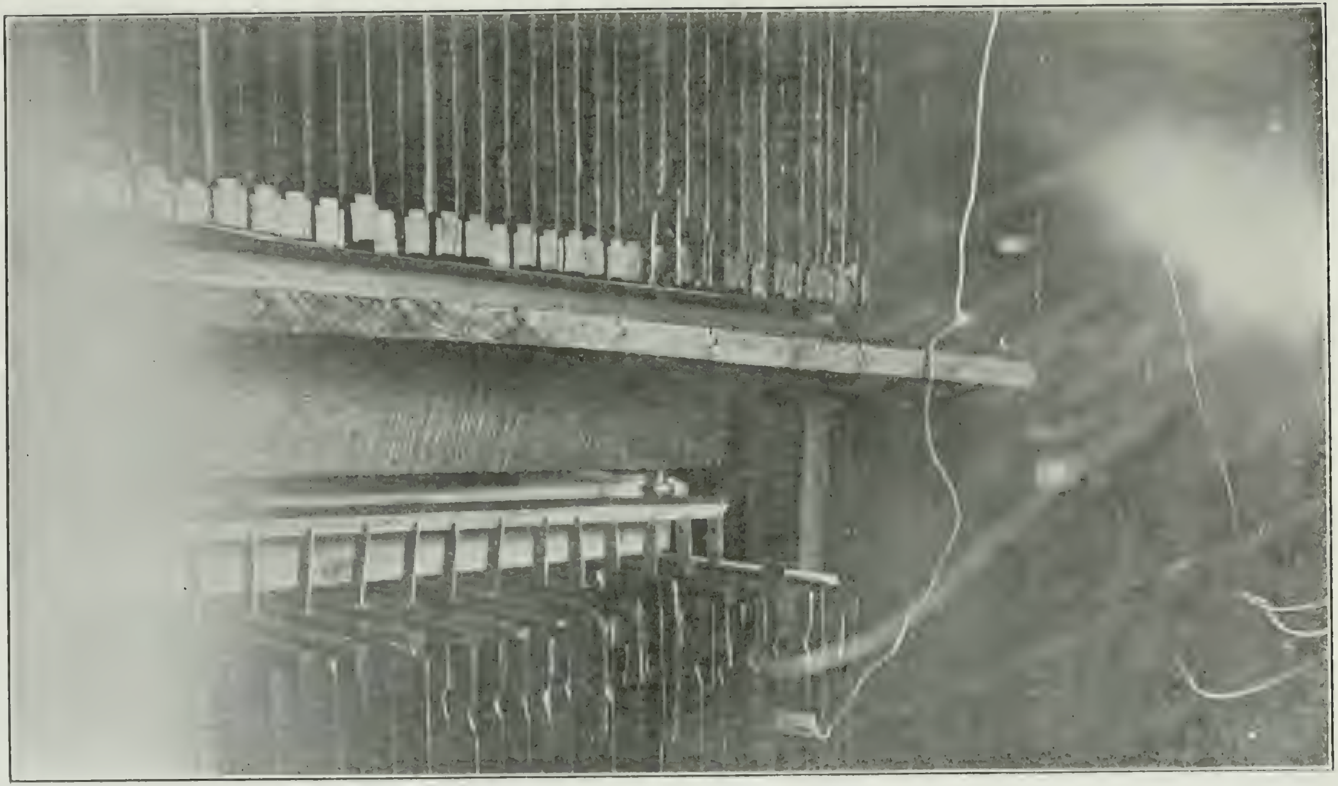


C.—General view of the Lindsay plant looking down the river towards Lindsay.

D.—Interior of the Ontario Board of Health Testing Laboratory in Lindsay.



E.—View showing the concrete work and the straining valves at the bottom of the square filter.



F.—View of Ozonizers as finally installed.

REPORT ON BURKS FALLS WATER SUPPLY.

By T. Aird Murray,

Consulting Sanitary Engineer, Toronto.

In accordance with your letter of the 29th September last, instructing me to proceed to Burks Falls to report on an efficient method of either improving the present water supply or obtaining water from some other source, I visited Burks Falls on four days of October last, viz., the 18th, 19th, 20th, 21st.

Along with Dr. Barber (the Medical Health Officer of the town) and other leading citizens, I made a thorough examination of the present source of supply relative to quality and quantity of the water. I also examined into the possibility of adopting other or alternative supplies. I now beg to report as follows:

Present Supply from Reazin Lake.

The present supply of water is obtained from a small forest lake three acres in extent, located about 146 feet above the town hill. Water is led from this lake by gravitation to the town.

Quality of the Water.—Colour brown, having the characteristic appearance of bog water. Smell and taste distinctly of the products of decayed vegetable matter. Analyses of the water made by your analyst show a high degree of vegetable pollution, but that the water is otherwise pure from a pathogenic standpoint. The taste and odour render it very objectionable to consumers.

Source of Lake Supply.—An examination of the lake showed no visible supply, such as a stream or any defined inlet. The lake is surrounded on all sides by forest, the growth encroaching upon the margin of the lake. There being thus no visible supply, the ordinary investigations were made to trace the source of the incoming water. The lake ranges from twenty to thirty feet in depth throughout its maximum area, and the Fahrenheit temperature of the water being taken at several points, readings ranged from 34° in the centre to 39° at the edge of the lake, while the atmospheric temperature registered 38°. The only explanation for the water being so much colder than the atmosphere and the water at the edge of the lake is that the supply is from springs located at the base of the lake.

Quantity of Water.—By opening one of the sluice valves on the main supply pipe the lake was lowered in level seven inches in eighteen hours, about 457,359 gallons having been running to waste. During the following twenty-four hours, the sluice valve being closed and the town continuing to obtain its normal supply, the level of the lake rose one inch, equivalent to a quantity of 65,337 gallons of water. The population of Burks Falls is 1,200, and allowing a rate of fifty gallons per head per day for all purposes, including waste, a daily consumption may be assumed of 60,000 gallons. This consumption, plus the amount of water the lake made during the above twenty-four hours, equals 125,337 gallons, which may fairly be taken as the incoming supply to the lake from the springs.

Before the lake was lowered to the extent of the seven inches, a considerable overflow existed, forming a stream of water flowing from the lake through the forest. Owing to the lowering of the water this overflow was cut off, hence the explanation of the water rising in the preceding twenty-four hours, although the usual demand was being made upon it for town consumption.

The above data show a sufficient supply for domestic purposes for Burks Falls. The main objections to the water, however, are the taste, odour and colour.

Alternative Sources of Supply.

I inspected several of the surrounding lakes, and examined the topography of the valley with reference to the possibility of obtaining water either from the lakes or from springs or wells. A tannery located in the valley obtains a supply of water approximating 12,000 gallons per day from a well sunk ninety-five feet in depth. The quality of the water is satisfactory for domestic purposes, but the watershed from which this water drains is not of sufficient area to warrant a supply equal to the demands of the whole town. If another well was sunk to tap this supply of water it would probably result in taking away the tannery supply and not provide an adequate supply to the town. The valley in which the town is located is a comparative basin of rock formation, with a shallow covering of alluvial deposit of gravel and sand, the centre of the valley being drained by a river. The only water which can be anticipated by wells is the small amount flowing through this layer of alluvial deposit to the river.

With reference to the neighbouring lakes. The only lake which deserves practical consideration is Three Mile Lake, from which an ample supply of pure and clear water could be obtained. Mr. Willis Chipman, C.E., has recently reported to the town on this source of supply. Mr. Chipman's estimate of cost is from $40,000 to $50,000, and this appears to be a fair estimate. He recommends Three Mile Lake as an ideal source of supply for Burks Falls. All the evidence which I obtained proves beyond doubt that in this conclusion he is correct. If it is a question of abandoning the present supply from Reazin Lake, I must then recommend a supply from Three Mile Lake.

The Financial Aspect of the Problem.

The Town of Burks Falls is not in a financial position to meet any large expenditure for a new source of water supply at present. The general tax rate is thirty mills. The amount available for assessment is $282,387, while the local debt is close on $40,000. The municipality could not at present float a debenture loan. Therefore, although the Three Mile Lake scheme is in many ways desirable, it is not practical at present. Such a scheme should, however, be the ultimate aim of the municipal future policy with reference to the water supply.

What is Practicable?

The objections to the present water supply are on account of colour, taste and odour, otherwise the water is wholesome.

The colour can be almost totally removed. The taste and odour can be totally removed. The treatment for the above removal can be accomplished at a small expenditure compared with that necessary for a change of source of supply.

The brown colour of the water is due to tannin from the presence of leaves and logs in the lake. The taste and odour are due to the water entering the lake having to pass through a layer of decomposing vegetable silt. The water in passing through this layer absorbs gases which are the products of the decomposition, and the surface of the lake is not large enough to allow of complete aeration and oxidation.

The location and depth of the lake render it too expensive to attempt to clean out and remove the silt: such a work would probably cost as much as a new water supply from Three Mile Lake.

There are little or no solids in suspension contained in the water. While the water is discoloured, turbidity is nil. The water, therefore, does not require filtering in the ordinary sense of straining, but it does require (*a*) aerating in order to get rid of the absorbed gases; (*b*) oxidation and nitrification, in order to mineralize the organic ammonia and so reduce the vegetable-contained matter in solution.

Recommended.

That an aerating and nitrifying plant be established on the line of supply pipe near the lake, providing an hydraulic head of at least 7 ft. 6 in. at the plant.

Drawings of an installation designed to meet the particular conditions are attached to this report.

The plant consists of a rough continuous filter on the percolating type, made up of 4 ft. 6 in. depth of gravel (about walnut size), and a top layer of 1 ft. 6 in. depth of charcoal (about 1 in. cubes). The water to be distributed over the surface of the filter by spray pipes operated under pressure, and to be collected by under-drains discharging into an effluent channel constructed along the sides and lower end of the filter. A measuring weir is provided at outlet end of the channel, and a controlling valve to regulate the supply from the lake is provided on the main supply pipe to the filter.

The filter will never be under conditions of saturation, as the water passing continuously through the filtering material will be in constant contact with the air.

The distribution of the water by a spray method provides aeration.

The layer of charcoal will remove the colour, the effect of charcoal in removing colour from water due to tannin being well known in practice.

The gravel provides a nitrifying bed, in which organic matter in solution is mineralized. Nitrification will not immediately take place on first using the filter, but two or three weeks must elapse before the filter becomes what is called mature, and this action developed. As soon as nitrification is commenced, the effluent being first aerated, then decoloured, and the organic matter mineralized, the water will be minus its objectionable qualities.

The plant must be protected from frost, and for this purpose a wood frame building is provided.

Storage of the treated water will be required to the amount of half the daily capacity, viz., 50,000 gallons, as the filter will work continuously day and night. A tank, 40 ft. by 10 ft., holding 5 ft. depth of water, is provided with a cover to protect from frost. Once the filter is regulated to the daily supply, little attention will be required except during winter, when it will be necessary to heat the building with a stove and maintain a temperature above freezing point.

I estimate the cost for the whole of the above plant at $3,500.

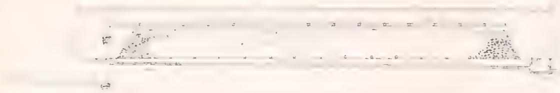
The above provides for a system which is admitted to be the most efficient for treating water of the above character. It is recommended generally for water polluted by algae growth, and, in fact, for all water contaminated by ordinary vegetable matter in solution, when it is not a question of the removal or sterilization of pathogenic bacteria, none of which are present in this particular water.

Ontario Provincial Board of Health.

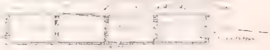
Proposed Aerating & Nitrifying Bed - Burks Falls Water Supply

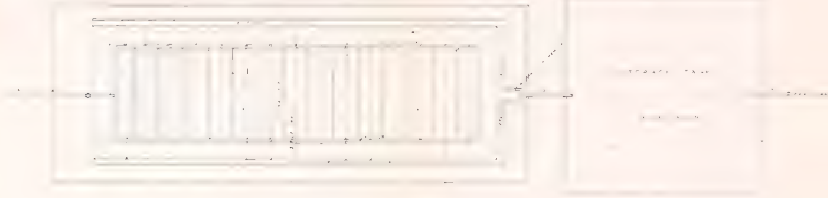
REFERENCE

[illegible]

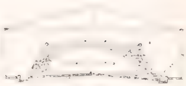


LONGITUDINAL SECTION





PLAN



[illegible]

[illegible]

Report *re* Cobalt Water Supply

By R. W. Bell, M.D., Medical Inspector.

Plans and specifications for water works and sewerage systems for the Town of Cobalt were placed in my hands by your Secretary, with instructions to look over the situation and report thereon. I visited Cobalt on July 6th, and found there had recently been installed a pumping station on the shore of Sasaginaga Lake, near the Buffalo Mine, and the water was being delivered to the citizens of the town from this source through iron pipes laid on the surface of the ground. I believe your Board approved of a scheme two or three years ago, providing a supply of water from Clear Lake, but this was never carried out, and now the application is for approval of the Sasaginaga supply with a filtration plant of some kind, or an alternative one from Clear Lake without filtration, the cost being about the same. Samples of water from both the lakes have, I understand, been frequently examined by your Bacteriologist, with the report generally being more favourable to Clear Lake as more free from algae. I visited both lakes and sent in three samples of water from each, taken at various points for examination. Dr. Amyot's report on these, herewith attached, shows virtually no difference, and both free from pollution at the time of my visit. However, with the liability to contamination and the usually known large quantity of algae, I do not think it would be safe to use either supply without previous filtering. The expressed desire on the part of the municipal authorities is to use the Sasaginaga water without filtration for a period of two or three years, until some revenue can be raised from this source to pay for the filtration plant. This, to my mind, would be unwise, as a great risk in the meantime would be run.

A slight change in the course of the main from that indicated on the plan submitted is desired, but it is only a straightening and shortening of it for a few yards, and of no consequence. The situation of the present pumping station is not where indicated on the plan, but if Sasaginaga Lake supply is approved, the change, only being across a small bay, will not affect it adversely.

Sasaginaga Lake would afford an ample supply of water, while I think it yet doubtful whether Clear Lake would do so or not. It is only about 1,000 yards long and 50 to 400 yards wide. I was informed that it was very deep, varying from 20 to 100 feet. There is no visible inlet by creeks, etc., and it must be supplied by a direct watershed or by springs, or both. The outlet is into Sasaginaga Lake a few hundred yards distant. The shores of both lakes are, as a rule, high and rocky, but there are some rather marshy shores in the bays of Sasaginaga.

Re SEWERS.

The sewage of the town at present either finds its way directly into Cobalt Lake, or into a ravine which angles across and to the north of the town, and along a portion of which there is a box drain. It is intended to utilize this ravine for a main sewer, with a sewage disposal plant near the Athletic Grounds at the north end of the town, the liquid from the disposal works being carried a short distance further by a pipe and then discharged in a swamp near Sasaginaga Creek.

a small outlet from the lake which also empties into this swamp. Beyond the swamp the waters are again narrowed into a creek, which ultimately reaches Lake Temiskaming.

The intention, I found, although not clearly indicated in the specifications, is to lay the water and sewer pipes in the same trench, except at two or three points where, for a short distance, the sewers will cross private lots, so as to follow the course of the ravine. This, I consider, rather a serious matter, and to be avoided if possible.

REPORT ON

THE WATER SUPPLY AND SEWERAGE.

COBALT, ONTARIO.

——— & SUTCLIFFE, C. E.

In accordance with your instructions, we have carefully investigated the questions of water supply and sewerage for your town, making such surveys as were necessary and possible at the present season, and after considering in detail the whole problem, we have the honour to report as follows:

Water Supply.

The previous report and survey of your proposed water works system chose Sasaginaga Lake as the most suitable and economical supply. Our own observation of this lake and its surrounding country, as far as we were able to observe, under present circumstances, indicated that this supply would be the proper one to adopt, being within short distance of the town, of considerable area and having many other advantages from a hydraulic stand-point. Our accurate surveys for pipe lines, etc., were therefore made with reference to this lake as a source of supply.

We regret to learn that in the summer season the waters of Sasaginaga Lake contain large quantities of vegetable organisms, known as algæ, etc.

While these organisms are in themselves harmless, where they exist in large quantities they seriously affect the quality of drinking water, sometimes causing the water to both smell and taste badly.

It may be here noted that this is not an uncommon thing, as these vegetable growths have given much trouble in the reservoirs of many water supplies, necessitating some treatment of the water.

Dr. Amyot reports that Clear Lake is not so much affected in this way, but that there is some danger of pollution from the mining companies operating at the eastern end of the lake.

We have considered the possibilities of a water supply from other sources in the vicinity, but, with our present knowledge, the problem resolves itself into two solutions:

(1) To take the supply from Sasaginaga Lake, providing a filter plant to filter the water during a portion of the year.

(2) To adopt Clear Lake as the supply, requiring about 3,000 feet more of supply main, with the pumping station at some suitable location on Clear Lake.

In our own opinion there are two important questions to be answered before the latter source should be adopted:

(1) Is the supply from Clear Lake sufficient for the present and for the future growth and expansion?

From what information we have before us the watershed supplying this lake is somewhat small, and certainly before deciding this question, its contributory area would have to be accurately surveyed and calculated.

(2) Would not the vegetable growths, as found in Lake Sasaginaga, most likely also occur in Clear Lake in sufficient quantities to make filtration of this supply necessary?

It seems reasonable to anticipate some trouble in Clear Lake from vegetable growths in the warm weather, and Dr. Amyot is of the opinion that the danger of possible pollution in this lake from mining companies would require filtration of the water. We are of the opinion, therefore, that no advantage would be gained by adopting Clear Lake as a source of supply, and that all things being considered, Sasaginaga Lake is the best supply to adopt from the standpoints of quantity and general service.

If it were thought, however, advisable to delay the final selection until some further observations of these lakes could be made after the ice is off, this would not necessarily delay the prosecution of the major portion of the construction of the work.

From the accompanying plan it will be seen that either supply will be brought to town by practically the same route, and that from the standpipe in, the work is identical in both systems. If desirable, this portion could be proceeded with, without delay, and in the meantime, some further investigations relative to the supply could be made. We feel, however, that further information would confirm the opinion as given above.

In the estimate of cost following, provision is made in one case for the filtration plant, and also for the additional cost of bringing the water from Clear Lake. From this it will be noticed that the relative cost is very nearly the same. It may be added, however, that if a sufficient supply of suitable unfiltered water could be procured at all times from Clear Lake, it would in that case be the more economical one.

Estimated Cost of Water Works.

Sasaginaga Lake Supply.

2,000 feet of 10-inch supply main	$ 4,700 00
2,300 feet of 8-inch distribution main	5,575 00
6,100 feet of 6-inch " "	13,785 00
900 feet of 4-inch " "	925 00
2 10-inch Valves	60 00
6 8-inch "	120 00
14 6-inch "	210 00
21 Fire hydrants, set	1,400 00
Standpipe, 25-feet dia. x 50-feet high	4,500 00
Duplicate Motor Turbine Pumps	4,000 00
Intake Piping well, discharge, etc.	1,600 00
Pump house foundations, etc.	2,225 00
	39,100 00
Filtration plant at Lake Sasaginaga	7,000 00
	46,100 00
Add 10% for engineering and contingencies	4,610 00
	$50,710 00

Clear Lake Supply.

Additional supply main if unfiltered Clear Lake water is taken	6,000 00
General system	39,100 00
	45,100 00
Add 10% for engineering and contingencies	4,510 00
	$59,610 00

The accompanying plan shows the general design of the system indicating the location of mains, hydrants, valves and all other appurtenances. The system as proposed will give an adequate fire service all over the built-up portion of the town, with a maximum efficiency in the present business portions of the community.

Sewer System.

In gathering the data necessary for the proper consideration of the drainage of the town, we made an investigation of the present 10-inch sewer which was laid for the purpose of carrying off surface drainage. Our enquiries and inspection of this indicate that as portions of this drain are laid without cement joints, and also without regard to the needs of house drainage, it would not likely be satisfactory as a sanitary sewer. Furthermore, as the conditions at the outlet make it necessary to adopt some means of purifying the raw sewage, it is considered advisable for many reasons to keep the house sewage separate from the surface water. We therefore propose to keep the present sewer for storm water and surface drainage only. To serve this purpose, additions can be made to it from time to time when required, with such additional catch basins as may be needed for street drainage.

The main drainage system or sanitary sewers, as shown on the accompanying plans, are designed to serve the present built-up portion of the town, which will also have the advantage of water mains. The sewer levels are so arranged that future additions can be made when required. With some few exceptions all the buildings of the present settled portions can be drained into the system. The main drain follows the lowest part of the valley running through the town, thereby serving the deepest cellars and keeping the excavation principally in earth work. To attain this much desired condition, it has been found necessary to cross the building lots in four places as shown on the drawing. If properly arranged between buildings this should not inconvenience anyone after the sewer is once laid.

Satisfactory grades have been obtained in all the sewers, sufficient to maintain good cleansing velocities of flow, all of which tend to satisfactory operation and maintenance.

Disposal Works.

We have interviewed Dr. Hodgetts, Secretary of the Provincial Board of Health, with reference to this important matter, and after considering the conditions under which the sewage will be discharged at the outlet, we understand that some efficient method of sewage disposal will have to be adopted in connection with the general drainage system.

The accompanying plan shows, and the estimate provides for a complete sewage purification plant, consisting of liquefying tanks with appurtenances, and percolating filter beds. It is not likely that the Board of Health will insist upon the installation of the complete disposal plant at first. If it is understood that the Corporation are willing to meet the requirements of the Board of Health to extend the plant when such is found to be necessary, probably the tanks will be considered sufficient to start with. This will reduce the amount of appropriation required by over eight thousand dollars. After the sewage system comes into general use, and the daily flow becomes of such proportion that bacteria beds will be required to prevent the pollution of the creek, these can be added in sections to suit the requirements which can then be accurately estimated.

This part of the system can be conveniently located in the territory near the athletic grounds, where the contour of the ground and the general conditions will facilitate the proper and economical construction of this part of the work. The effluent or purified sewage will be discharged into the creek.

THE ESTIMATED COST OF THE SEWER WORK.

(1) 2,820 feet of 12-inch sewer outfall	$ 3,907 00
(2) 650 " 10-inch sewer	1,085 00
(3) 757 " 9-inch "	3,795 00
(4) 3,536 " 8-inch "	10,311 00
(5) 850 " 6-inch "	1,377 00
(6) 30 Manholes	1,600 00
Sewage disposal plant—Tanks	4,350 00
—Filters	8,650 00
	35,075 00
Add 10% for engineering and contingencies	3,507 00
	$38,582 00

In conclusion we may say that before any contracts for excavating and trenching are made, it would be advisable as soon as the snow is off to make a re-survey of the locality for the purpose of making borings to locate the depth of rock below the surface at all points. This will be necessary to enable contractors to bid intelligently on the work.

In the meantime, contracts for all materials, piping, etc., should be let at an early date if the work is to be prosecuted to a conclusion in the coming summer.

REPORT UPON WATER WORKS FOR THE VILLAGE OF BURLINGTON.

By WILLIS CHIPMAN, C.E.

In July, 1902, I was consulted by the members of a Citizens' Committee respecting Water Works for the Village, and gave the Secretary of the Committee, Mr. F. B. Bennett, an outline of the system that I would recommend for adoption, and an approximate estimate of the cost. Nothing further appears to have been done in 1902, nor from that date to this year. Early in May, 1908, I was engaged by the Council to prepare a proper report, with an estimate of cost. The necessary field work was completed by my assistant in May.

Topography.

The Village is located on the north shore of Lake Ontario, 32 miles west of Toronto, and seven miles east of Hamilton, by rail. The northerly end of Burlington Beach adjoins the westerly limit of the Village. Along the Beach passes the main highway to Hamilton, G. T. R. freight line, Hamilton Radial Electric Railway, and two Electric Transmission Lines, all of which also pass through the Village.

The elevations are such that good surface drainage can be provided, and it is not expected that the trenching for pipe-laying will be difficult. Shaly rock underlies the clay and sand along the lake shore, and it is possible that some rock may be struck along Water Street.

Immediately west of the Village is the "Brant House," a well-known summer hotel, and on the "Beach" there is a continuous row of summer cottages.

The central part of the Village is compact, but there are three long arms, Water Street extending northeasterly about a mile along the Lake Shore, Brant Street a mile north-westerly to the G. T. R., and the road along the beach over a mile southerly.

Population.

The population of the Village is now about 1,500, and the assessment about $450,000, but this is a low valuation. Although Brant Street North and Water Street East are not closely built upon, the majority of the owners will become water-takers. West of Hager Street (which is the Village limit) there is also a large suburban area that will require water. This area should be annexed to the Village as far west as the Halton-Wentworth Line. The residents now enjoy all the benefits of sidewalks, electric lighting, schools, etc., and they should contribute their share of the cost and maintenance to the Village Treasury.

All that portion of Burlington Beach north of the Canal should also, in my opinion, be annexed to the Village of Burlington.

Including the two areas mentioned, the summer population may be taken at nearly 2,000 people.

Quantity.

The quantity of water necessary to supply all the wants of a population of 4,000 people should not exceed 300,000 gallons per day. To this must be added something for municipal uses and leakage, or say 100,000 gallons per day, or about 300 gallons per minute in all.

To comply with the requirements of the Fire Underwriters, two standard fire streams, throwing 200 gallons per minute, should also be provided for, making a total of 700 gallons per minute as the supply required. With a large storage basin or reservoir to draw upon for fire supply, it is quite probable that 200 gallons per minute would be ample for some years, but the works should be so designed that this supply may be supplemented at any time at a reasonable cost.

Sources of Supply.

Several sources of water supply have been suggested:

(*a*) Lake Ontario.
(*b*) Burlington Bay.
(*c*) Lake Medab.
(*d*) Wells and Springs.
(*e*) Burlington Beach.

The water of Lake Ontario, if taken from a point sufficiently distant to avoid shore pollution, would be an ideal water.

At Burlington, however, the entire drainage of the Village enters the Lake and the shore line is of such contour and the banks of such materials that the Lake becomes extremely turbid during gales. The expense of laying an intake pipe, or of constructing a tunnel from the shore line to a point where reasonably pure water might be secured, would be prohibitive.

Burlington Bay now receives the sewage from the City of Hamilton, with a population of about 70,000, and into the northerly end of the Bay, which is a shallow marsh, the Brant House discharges sewage.

This source of supply may be eliminated owing to the impurity of the water.

Lake Medab is a small sheet of water with an area of about 25 acres, lying in the Township of East Flamboro', and distant about 9 miles from Burlington. Its outlet supplies Waterdown Creek, and its elevation is probably about 300 feet above Lake Ontario.

Although the flow in Waterdown Creek may become less than 200 gallons per minute during the summer months, it might be practicable to store sufficient water by constructing dams, to maintain a larger daily flow.

It is doubtful if the pressure due to gravity would give a proper fire service, owing to loss from friction in the long conduit pipe, and there are no hills in the Village upon which to construct a service reservoir.

The conduit pipe would probably cost from $3,000 per mile, in the upper sections, to $6,000 per mile in the lower sections, and a large sum might be claimed by the mill owners along the stream below the lake.

Nothing definite is known as to the quality of the water, and no surveys have been made to determine the elevation of the lake, or the practicability of the scheme.

In my opinion, it is also beyond your present financial means.

There are no visible springs of importance within a reasonable distance of the Village, and there is no prospect of obtaining a water supply from deep drilled wells. A small quantity of water is found in pockets of sand and gravel above the rock surface, but this water is liable to surface pollution, and the quantity available would be entirely inadequate for a municipal supply.

In 1902, I was of the opinion that you should obtain your supply from wells or from galleries constructed on Burlington Beach. Upon my visit in May I discovered that the Beach Commissioners had adopted this scheme, and that a well was being sunk south of the Canal for supplying the Beach residents, and to give fire protection. I am informed that the pumping machinery is now being installed, and that the works will soon be in successful operation. At the time of my visit the water being pumped from the well was perfectly clear, although Burlington Bay was turbid. An elevated tank has been erected near the well and pumping station, and a line of cast iron pipes laid north to the Canal and south to the end of the Beach.

Fire hydrants have been set at proper points for fire service.

I understand that a pipe line about 2,000 feet long was laid northward from the Canal, as a part of the Beach system, but at present the connection across the Canal, which would be an expensive undertaking, has not been made. This pipe line should be supplied by your proposed Burlington Municipal System.

I am convinced that you can obtain an adequate supply of pure water at a reasonable cost from wells, and galleries constructed immediately north of the Halton-Wentworth Line, near where the O. E. D. Co. line crosses the G. T. R. Railway. The point selected should be south of the marsh on the Burlington Bay side, and as near midway between the Canal and the north end of Beach as possible.

One circular well, similar to the one sunk by the Beach Commissioners, may not give sufficient water. If not, a collecting gallery may be laid parallel with the Beach to a second well. The sand and gravel will so filter the water that it will be quite suitable and safe for all domestic purposes.

Pumping Station.

The pumping station should be constructed contiguous to the source of supply. The building should be fireproof, brick walls, and concrete foundations, with slate roof.

The machinery should be ample for maximum present requirements. Two Electric Power Transmission Lines pass the site of pumping station, and there can be no question that electric power should be adopted for pumping.

Reservoir.

The well or wells at pumping station will store a certain amount of water for fire purposes, but to permit the pumps being closed down during the night, and to be operated at their most economic speed during the few hours necessary to run them, it will pay to erect an elevated tank similar to the one erected on the Beach this season, or a cylindrical Water Tower, otherwise known as a standpipe. This structure should be erected near the centre of the village, or near Brant Street, north of Caroline. If erected near the Town Hall, the firemen could close the outlet valve to Tower, and thus permit direct pressure for fires. In many places in Ontario the pressure from the Water Tower is found sufficient for fires in low buildings, but for over three storeys the Tower should be cut off.

Although I have shown the Tower at the south-east corner of Brant and Maria it may be erected elsewhere.

Distribution System.

The accompanying plan shows the proposed pipe distribution system, location of fire hydrants, valves, etc.

The eight-inch force main is to be laid along the highway on the beach from the pumping station northerly to the intersection of Water Street and Sand Road, thence under the G.T.R. and along Water Street one block, thence northerly to Elgin, thence along Elgin one block to Nelson, along Nelson to Ontario, and along Ontario to Hager.

To this point the pipe line is entirely outside the limits of the village, and the route described may be altered without affecting the system or the estimate of cost.

From Hager Street the eight-inch pipe is to be continued along Ontario to Brant, thence north to Maria and south to Water Street, thence along Water to Pearl.

I propose to lay six-inch pipes on Water from Pearl to Torrance, on Elizabeth from Water to Maria, on Maria from Elizabeth to Brant, on Brant from Maria to Caroline, and on Water from Brant to Locust.

Four-inch pipes are to be laid on:—

Hager, from Ontario to Caroline.
Burlington, from Water to Ontario.
Locust, from Water to Caroline.
Pearl, from Water to Maria.
Water, from Torrance to Guelph.

This gives a total of 24,000 lineal feet of piping, comprising:—

11,000 feet of 8-inch.
4,700 feet of 6-inch.
8,300 feet of 4-inch.
53 Fire Hydrants.
2 Street Sprinkling Cranes.
37 Gate Valves.

The pipes should be laid at sufficient depth to give a covering of four and one-half feet.

It has been proposed that the mains be extended on Brant from Caroline to the G.T.R. Station, or to the northerly limit of the town.

The distance to the former from Caroline Street is 5,300 feet, and to the latter 6,000 feet. I cannot advise you to lay this main unless the immediate revenue to be derived from water-takers along the line will exceed the interest and sinking fund on the cost.

Grand Trunk Supply.

The Grand Trunk Railway obtains its supply from a curbed well sunk in the sand and gravel at the north end of Burlington Beach. The water is forced by steam pump through a six-inch cast iron main about 8,500 feet in length to a standard tank erected on the south side of the track east of the Junction Station, and east of the road to the station.

The rail at the station has an elevation of about 80 feet above Lake Ontario and 41 feet above the intersection of Brant and Caroline.

If the Railway Company should desire to take water from the village system, the G.T.R. pipe line could be utilized, the supply being delivered to the Company at a meter house to be constructed near their pumping station, or a new pipe laid on Brant northerly from Caroline. No proposition should be considered for supplying water to the railway or to other large consumers otherwise than by meter, and in each case a minimum charge should be demanded.

Cost.

I estimate that the proposed system of water works will cost as follows:—

Well and Gallery	$ 2,500	
Pump House	2,000	
Pumping Machinery	3,500	
		$ 8,000
Water Tower	$ 4,800	
Foundation	1,200	
		6,000
Distribution System—		
400 tons pipes	$13,400	
Special Castings	600	
Hydrants, Valves, etc.	3,000	
		$17,000

Labour laying 24,000 feet pipes, setting valves, hydrants, etc.	7,000
Services and Meters	1,500
Printing and Advertising	500
Engineering	2,000
Total cost	$42,000

If the main be extended on Brant to the Grand Trunk Railway from Caroline Street, the above estimate should be increased by $4,000 if four-inch pipe be laid, or by $5,200 if six-inch be adopted.

The items for services, meters, engineering and sundry expenses are frequently omitted from preliminary expenses of cost, but I believe that they should be included.

Revenue and Expenses.

The revenue from your water works system from domestic consumers alone will pay the operating expenses after the first year. The interest and sinking fund charges will be offset by the decrease in the insurance premiums, although these sums must be collected annually by general taxation. There is also the added security from fire loss, which applies to residences as well as to places of business, hotels, factories, etc., and there can be no doubt that the installation of a water works system will attract desirable residents and profitable industries.

You will find upon enquiry that water works systems invariably pay a handsome profit within a few years after completion, and that when intelligently operated they become the most valuable of a town's assets.

REPORT *RE* BURLINGTON WATER SUPPLY.

By Dr. R. W. Bell, Medical Inspector.

On March 5th, by the request of your Secretary, I visited Burlington, to look over the proposed source of water supply. With Mr. Springer, Village Clerk, I went to location on the sandbar forming Burlington Beach, about a mile distant from the village. This bar varies about 100 to 300 feet in width, and along it runs a line of the G. T. Railway, an electric railway and an ordinary roadway. Along either shore of the beach there is a continuous row of cottages, frequently not more than 10 to 20 feet apart, and all provided with shallow pit closets in the sand. These cottages, although vacant most of the year, are occupied for three or four months in summer by a large number of persons. Under these conditions the water along the shore line is likely to be considerably polluted. I might here also mention that the sewage of the village is also discharged into the lake, and that, I am informed, the natural current will carry it along the beach shore—this, however, being varied by the winds.

It is proposed to sink wells or water galleries in the sand on the Lake Ontario side of the beach, into which the lake water would flow, at a point about 2,000 feet north of the canal cut into the bay, and about a mile and a half distant from the centre of the village. This is what the plan submitted indicates, although Mr. Chipman, C.E., in his specifications, at one place says:—"The point selected should be south of the marsh on the Burlington Bay side"—evidently an error. While in another clause, referring to Burlington Bay, with its Hamilton and Brant sewage, he says:—"This source of supply may be eliminated owing to impurity of the water."

With varying winds the water will at times be very turbid, but may be cleared of most suspended matter by filtration through the sand, but I fear the results from closet and garbage pollution.

This appears to be about the only available source of supply within the means of the municipality. The beach with the cottages is all outside the village.

If it is deemed expedient to approve of the source and method of obtaining the supply mentioned, I would suggest that the village of Burlington be required to annex the beach as far as the Halton-Wentworth boundary, a short distance beyond the proposed wells, so as to control the sanitary surroundings, then to abolish all pit closets and require boxes with the dry earth system to be used, and have these cleaned and all other garbage removed by a *civic* scavenger sufficiently often to prevent any possibility of water pollution.

REPORT ON PROPOSED MARKDALE WATER WORKS SYSTEM.

By Charles H. Mitchell, C.E.

Under instructions from the Municipal Corporation of the Village of Markdale, I beg to submit to you the following report on the water works system proposed to be installed by the village. This report accompanies an application now being made by the village for the approval of your Board of the proposed source of the water supply and other features in which your Board is interested:—

The Village of Markdale.

Markdale is situated in the County of Grey, on the Canadian Pacific Railway. The Saugeen River passes about a mile north-west of the village, and a small branch of the same, which in this report I call "The Creek," passes through the south-westerly edge of the village. The population is about 1,200. The village has a distributing point for a surrounding farming community, and its people are engaged mostly in trade for that purpose. There is a small amount of manufacturing done, but such is only incidental to the immediate locality, and a small furniture factory recently built, largely by bonus of the village, has not yet commenced operation. The stores, public buildings and houses are largely brick and of a very substantial nature.

Topographical Features.

The village is built upon rising ground, the soil of which is gravel, and rock underlies the principal business portion at a depth of about 40 feet. This business portion is about 50 feet above the level of the Creek, and the highest point (near the school) is about 90 feet above the Creek.

Present Water Supply.

The water now used by the village is entirely from wells, most of which are driven into the rock and from which apparently very good water is obtained, although of a hard variety. There are several private windmills pumping these wells. A number of families are usually served from each well by ordinary pumps.

There is no means at present for disposal of sewage, except through a shallow drain built from the central business portion down through Argyle Street to the lower ground, near Lorne Street, whence it sweeps away through the soil taking a direction westerly toward the Saugeen.

Proposed Water Works System.

A by-law was passed by the ratepayers in May last authorizing the raising of $20,000.00 by debentures for the construction of the water works system.

The system proposed is for both domestic and fire purposes, and will consist of pipes varying from six or eight inches down to two inches in the smaller distributories. The general source of supply will be the Creek valley, water being obtained therefrom and pumped to a stand-pipe or elevated tank on hill near the school. It is thought a few hours' pumping each day will be sufficient, except in cases of fire. The amount likely to be used per day will for some years not exceed 50,000 gallons, and the capacity of tank is arranged for this amount.

Sources of Supply.

The Creek rises about three miles to the east of the village, and is fed entirely by springs and other underground sources; these are evident throughout the valley at many points. The land in the immediate Creek valley throughout the whole distance is still wooded with cedar and other soft woods, and the land adjoining and in the district is a sparsely-settled farming district of rolling ground with considerable bush land.

The Creek for a mile above Main Street is a well-defined stream or series of streams averaging a water channel about thirty feet wide and a foot deep, flowing about 200 gallons per second under normal conditions. This is merely the visible surface flow, and I have no doubt there is a very large underground flow through the gravel forming the bed of the Creek. The water is very clear and of uniform temperature; cold in summer, and warm in winter. It may be noted that this stream has been for many years past a trout fishing locality.

Immediately above Main Street a mill pond exists, caused by a dam about five feet high. About 600 yards down from Main Street is a second dam about twenty-five feet high forming a considerable mill pond which supplies a grist mill owned by one Baird. Surrounding the latter mill pond is considerable bush land, particularly on the north-east side, and that portion immediately below Main Street has a fine grove of cedar, etc., extending for about 200 yards.

ANALYSIS OF WATER.

In November, 1907, a gallon sample of water was carefully selected from the Creek immediately below Main Street after passing over the dam. This was surface water from the Creek, and was selected without regard to locality. The sample was sealed and delivered to the laboratory of Professor J. W. Bain, of the engineering faculty of the University of Toronto, under whose direction the chemical analysis was made by Mr. E. Forster, B.A.Sc., a copy of which I enclose herein. I have no doubt that the water taken from the gravel bed below the Creek would show a chemical analysis even more favourable as a potable water.

PROPOSED INTAKE AND PUMP HOUSE.

The Corporation is anxious to purchase the Baird Mill and adjoining property extending from Main Street down stream along the Creek to and including the grist mill and dam, so as to permit the installation of a pump alongside the grist mill to be operated by water power therefrom. One of the principal advantages in this, as viewed by the village, is the cheapness of pumping and the arrangement whereby an attendant, who would ordinarily operate the mill, would be alongside the pump at all times, and thus be on instant call in case higher pressure for fire services were required.

With this in view, the village desires to collect water by means of a well alongside the Creek in the woods, about 200 yards down stream from Main Street, as indicated on plan, and convey the water therein collected by means of a wooden or earthenware pipe laid alongside the mill pond to the mill, there to be pumped and returned through the iron pressure mains to the village and tank.

It is proposed to sink a circular steel curbed well about eight or ten feet diameter into the gravel bed alongside the Creek, the bottom of the curb to be about six or eight feet below the level of the water in the Creek. The well will have no bottom, but will be entirely open to the underground flow through gravel bed, and it is expected that a sufficient supply of water will be obtained through the interstices of the gravel to supply the demand with a velocity through the interstices not exceeding five feet per minute with draft due to full capacity of pump. The top of the well would be carried, say, a foot above ground surface, and covered by a metal roof with a ventilator. The water for the pumps would be tapped out of the well about four feet below ground surface and, say, three feet below Creek surface.

The Corporation will desire to have an emergency connection between the pump and the mill pond, so that in case of fire or other emergency demand, if the ordinary source was out of order or insufficient, water could be temporarily pumped from the Creek itself.

On the west side of the Creek the nearest houses to the well site are farm houses on the hills, one being about 300 yards and another being about 500 yards distant; on the east side (towards the village) one house is about 250 yards, the new furniture factory about 500 yards, and a small tannery about a quarter of a mile distant. These are direct distances.

If the foregoing location does not find favour with the Board, I might point out that there is a possibility of securing a site at a point 500 yards up stream from Main Street, alongside the Creek, on lands owned by the County of Grey, whereon a well similar to that described might be sunk and the water piped from there down to the grist mill site, a total distance of about 1,100 yards, or nearly two-thirds of a mile. It is obvious that the large additional expense in this scheme is to be avoided by the village if possible, as in addition to the cost of construction they would also require to obtain additional land.

PROBABLE FUTURE CONDITIONS.

The proposed system, as outlined at present, should be sufficient for this village for a period of at least fifteen years to come, provided necessary small extensions are made. It is not likely that the sources of water supply would be seriously interfered with in that period of time, as the conditions surrounding the village and adjacent farming community are now pretty well established.

It is likely, however, that shortly after the installation of water works the village will require a system of sewerage of a simple and inexpensive nature. The natural outlet according to the topography would be toward the Saugeen trending to an outlet below (westerly) the Baird grist mill, to arrive at which access would probably be required through private farm lands.

REPORT *RE* MARKDALE WATER SUPPLY.

By Dr. R. W. Bell, Medical Inspector.

By instructions of your Secretary I proceeded to Markdale on March 6th inst., and with Mr. McFarlane, Reeve, Mr. Matthews, Chairman of the Water Works Committee, and Dr. Ego, I visited the proposed source of supply suggested in the specifications and plans furnished your Board.

The supply from the Creek shown, I think, would be ample, but there is considerable danger from contamination at the point indicated for placing the well—on the bank of the lower mill pond—perhaps not so much from the main portion of the village, although the slope is generally towards it and to the Saugeen River a little north-west, as from a couple of manufactories now in close proximity to the pond and about 200 yards above the proposed well. One of these is a tannery—small, to be sure—but still draining into the Creek. It is also the hope of the citizens that with a water supply to offer for domestic and fire purposes, other factories may be induced to locate here, and the most probable sites for them will be close by the Creek, and so furnishing further pollution.

The soil is a coarse gravel, which would have little effect in clearing the water filtering into the well. The water, if taken from this same stream about 700 yards further up and above the village, would, I think, prove quite satisfactory, as it would be beyond all probability of pollution, and only involve the additional expense of the wooden pipe and laying, the same pumping station proposed being used.

With this change in the location of the intake well, I can, from a sanitary point of view, recommend the approval of the scheme proposed.

REPORT ON WATER WORKS SYSTEM FOR TOWN OF RAINY RIVER.

By James A. Bell, Consulting Engineer.

I have carefully looked over your town with a view of recommending for your approval the installation of a system of water works for domestic use and otherwise in accordance with instructions to that effect. The result of my examination is as follows:

I find that the only available source of supply is the Rainy River. Some water can be obtained by sinking wells, but the water from that source is so hard that it is not adaptable for domestic use; and again, it is very improbable that a sufficient supply could be obtained in that way. I would, therefore, recommend that the water be taken from Rainy River on the easterly or upper side of your town. The point I have selected for the pump house would be on parcel 14, above Rainy River Mill, the suction pipe to extend about two hundred feet into the river, with a bell mouth screened intake, and protected by piling. I think the chances for contamination at this point are less than at any other location within reasonable distance. From this point the main supply pipe, eight inches in diameter, would extend north to Atwood Avenue, and thence westerly with branch lines of 6-inch and 4-inch pipe from this main, laid out as shown on accompanying plan. My estimate includes all necessary valves, boxes and hydrants. It also includes the erection of a pump house and the installation therein of two gasoline pumps, each having a capacity of 500 gallons per minute, to be capable of pumping together or separately, one air compressor and two pneumatic tanks, each tank having a capacity of 15,000 gallons, or a total of 30,000 gallons. About 20 per cent. of this quantity would be taken up by compressed air. Of the remainder, from 12,000 to 15,000 gallons would be available in case of fire, with sufficient pressure, and for domestic use you could count on 16,000 to 20,000 gallons. This would be the condition after the tanks were sufficiently filled and the air pumped in.

This installation would be a good deal cheaper than the erection of an elevated tank, and be equally as serviceable to the capacity mentioned above.

The pump house would be large enough to contain the pumps, compressor and tanks, and it would have to be heated in winter time.

My estimate of the cost of the works is as follows:—

Street Mains.

5,960 feet of 8-inch at $1.50	$8,940 00	
7,000 feet of 6-inch at $1.20	8,400 00	
1,600 feet of 4-inch at $1.00	1,600 00	
Special castings	600 00	
Valves and boxes	500 00	
28 Hydrants at $50.00	1,400 00	
Suction—200 feet at $2.50	500 00	
Bell mouth inlet	20 00	
Protection piles to suction	100 00	
		$22,060 00

Pumping House and Machinery

2 Pneumatic Tanks, capacity 30,000 gals.	3,000 00	
1 Air Compressor	450 00	
2 Pumps	3,500 00	
Foundations	500 00	
Building	1,000 00	
Land	500 00	
Engineering and contingencies	1,190 00	
		$10,140 00
Total estimated cost		$32,200 00

REPORT UPON WATER WORKS, VILLAGE OF WESTON.

By Willis Chipman, C.E.

Immediately after receiving your instruction, dated September 22nd, 1908, I visited Weston, and at different times examined the several proposed sources of water supply and went over the streets of the village. I now beg to report as follows:—

Population.

The village is located on the main line of the G.T.R. and C.P.R., eight miles northwest of the Union Station, Toronto, and on the east bank of the River Humber.

The population is now given as 1,600, and the assessed valuation at $560,000. Within the last five years a large number of residences of the better class have been erected, and if modern conveniences could be secured I have no doubt that your population would be doubled within ten years.

Several important manufacturing establishments have also been erected at Weston within the past two or three years, and, owing to your excellent railway shipping facilities and the cheap sites available, other factories may be expected, but manufacturers will hesitate to do so unless you can give them fire protection for their property, and essential home conveniences for the health and comfort of the families of their workmen.

Within the limits of Weston are several large blocks of choice residential property that only require water works, sewers and sidewalks to give them a reasonable market value.

Topography.

The Humber River at the G.T.R. bridge is about 150 feet above Lake Ontario, and in flowing through the village it falls about 30 feet, the bed being rock lying in horizontal strata. The main street of the village, which follows in a general way the easterly bank of the river, has an elevation of 40 to 60 feet above the River.

The greater part of the built-up portion of the village drains to the river, but more than half the area within the village limits drains easterly to Black Creek, that approaches within a few yards of the easterly boundary.

The soil varies from clay to sand of such depth that it is not expected that any rock will be met with in excavating for water pipes or sewers.

Quantity.

The quantity of water necessary for a population of 1,600 people should not exceed 120,000 gallons per 24 hours, but to this must be added something for water used for street sprinkling, leakage in mains, etc., or say, 80,000 gallons per day, making a total of 200,000 gallons per day, or about 140 gallons per minute.

If all the water services be metered the domestic consumption would not exceed 70,000 gallons, which, with the municipal demand, would make 150,000 gallons per day, or about 100 gallons per minute.

In my opinion, however, your supply should be sufficient for 4,000 people at least; that is, a daily domestic supply of 300,000 gallons if unmetered, or 120,000 gallons if metered. Allowing 120,000 gallons per day for municipal uses gives 420,000 gallons per day, or about 300 gallons per minute if unmetered, and 240,000 gallons per day, or about 160 gallons per minute, if metered.

I have allowed nothing in the foregoing for supplies to railways and large factories, which frequently demand large quantities, generally at extremely low rates.

It is a question to be carefully considered as to what extent you should tax the ratepayers of the village to construct a water works system for supplying water to factories, railways, etc. Many towns are to-day giving water to factories, etc., at the cost of pumping, the citizens paying interest and sinking fund on the cost of works.

This no doubt attracts factories, but it is nothing more or less than a bonus.

To comply with the requirements of the fire underwriters, two standard fire streams of 200 gallons per minute must now be provided for, and, when the population reaches 4,000, four streams. With a large storage basin or reservoir to draw upon, nothing more than the average daily domestic supply will be required, but the pumping machinery should be of sufficient capacity to give 400 gallons per minute at least over and above the domestic demand.

SOURCES OF SUPPLY.

Several suggested sources of water supply for the village have been examined, of which the following will be described:—

(1) Humber River.
(2) Black Creek.
(3) Springs south of Weston.
(4) Springs near Edgely.
(5) Wells.

During the most extreme drought the flow in the river would be sufficient for the requirements of a city larger than the city of Toronto to-day. The watershed of the river above Weston has an area of over 300 square miles, mostly agricultural lands. Part of the watershed lies in the "Ridges," from which the fall is rapid towards Lake Ontario. Remnants of the original forests are to be found throughout the broken ridges, but there are few, if any, large swampy tracts, and no lakes or large ponds within the watershed.

The largest village above Weston on the Humber is Woodbridge, some eight miles distant. Kleinburg, thirteen miles above Weston, and Bolton, eighteen miles, are small villages.

The river is subject to great variations in volume during the year, the maximum flow being many times the average flow, and during high water it is extremely turbid. All heavy rains also carry into it the surface drainage from tilled farms, roads and farmyards.

It is evident that the river water must be more or less polluted at all times, but such pollution is less dangerous than sewage contamination, and can be easily removed.

Black Creek in dry weather has a flow of about 500,000 gallons per day. During rains and freshets it carries innumerable quantities of suspended matters, but in the dry season it is fed from springs, and is comparatively clear. If it were in a state of nature it would give an ideal water supply, but practically the entire watershed has been cleared, and a large percentage of it is tilled land.

There would, in my opinion, be little choice as to quality between the Humber River and Black Creek.

The volume of the Creek would probably be quite sufficient for the immediate future requirements of the village if large manufacturers and railways were not to be supplied.

The small brook that discharges into the Humber from the eastward, at the Scarlet Road bridge, drains a level tract of low land of about acres area, surrounded on three sides by a plateau at about one hundred feet higher elevation. This low area is now largely waste land, part timbered, part tilled, and part too wet and boggy for cultivation. The brook is fed largely by springs that flow from the base of the plateau.

At the time of my inspection on October I estimated the flow of the brook at 130 gallons per minute, or about 185,000 gallons per day.

By purchasing the greater part of the low area it would be possible to store the spring freshet run-off, and thus increase the flow in the dry season. I would hesitate to advise you to adopt this brook as your source of supply owing to the deficient quantity. There can be little doubt as to the good quality of the water. It is to be regretted that there is not a greater quantity available.

Subterranean galleries in this area might yield a sufficient supply, but this could only be determined by expensive experiments; but to avoid future contamination and trouble from owners adjoining it would be necessary to acquire the greater part of the land within the low area.

The springs at Edgely were inspected, and found to be a large number of small springs that unite to form Black Creek.

It might be possible to construct a gravity system of water works for Weston, with these springs as a source of supply, but it would be an expensive system, owing to the length of conduit required, and for fire service pumping would be necessary. The volume of flow from the springs would not, in my opinion, exceed the flow in the spring brook at Scarlet Road Bridge.

After considering all the data produced respecting wells drilled in the vicinity of Weston, I am convinced that the chance of securing a water supply from wells would be highly improbable. In no instance has a large supply been struck in drilling for farmers, factories, etc., and in some cases the water has been unfit for domestic uses. If, however, you decide to sink a well as an experiment, I would suggest that it be sunk in the river valley west of the Electric Lighting Station.

SOURCE RECOMMENDED.

Within a few years I believe that a number of factories will locate at Weston, provided you are in a position to give them fire protection and water for manufacturing purposes. I am, therefore, reluctantly forced to the conclusion that the River Humber should be selected as your source of supply, with the full knowledge that the water must be purified before it can be safely used for domestic purposes.

Owing to its turbidity during certain months of the year, sedimentation basins or reservoirs will be necessary to remove the sand and mud, after which filtration will further purify it.

SEDIMENTATION.

Sedimentation basins such as proposed have been constructed in several cities and towns in Canada, including St. Catharines, Chatham, Thorold and St. Thomas, in the Province of Ontario. At Chatham the polluted water of the River Thames is pumped to a sedimentation basin, from which it is forced through mechanical filters into the city distribution system. The results at Chatham have been eminently satisfactory. The double pumping slightly increases the first cost and the operating expenses. For many reasons mechanical filters are, in my opinion, to be preferred to slow sand filtration for the water supplies of towns and villages in this latitude.

SYSTEM PROPOSED.

I would recommend that the following system be adopted:—

Erect a pumping station on the easterly bank of the river above the village above St. Alban's School site, the water supply to be taken directly from the river and pumped to a sedimentation basin to be constructed adjoining the pump house site. From this basin the water to be pumped through mechanical filters into the pipe system, and an elevated tank or water tower to be erected, on the highest ground in the village, of such capacity that the machinery may be operated at its most economical capacity.

PUMP HOUSE.

This structure should be of such dimensions as will permit of the installation of the pumping machinery and filters, and it is an advantage if it can be built of sufficient size for a duplicate pumping engine.

I propose a building with brick main walls on concrete foundations.

MACHINERY.

If steam power be adopted, two boilers should be installed and two pumping engines, one for pumping to the basin, the second for pumping into the pipe system, but so arranged that either may be used for either service. Compound duplex engines are the best suited for this service.

If electric power be adopted, the first cost would differ but little from the steam plant, but the building would in this case be smaller, as no boiler-house or chimney stack would then be necessary. The decision as to which power should be adopted will depend upon the cost at which electric power can be contracted for.

WATER TOWER.

I propose that a water tower or standpipe to contain about 100,000 gallons be erected on the high ground immediately north of the northerly end of North Station Street. This elevation will give a reasonable domestic pressure. For fire service the tower inlet pipe may be instantly closed from the pump house by closing an electrically operated switch, and direct pressure given by the pumping machinery.

The water tower will permit the machinery to be closed down at night, and for many years it will only be necessary to operate it a few hours out of the twenty-four. No small water works can be economically operated without a tower or elevated storage tank.

DISTRIBUTION SYSTEM.

The general plan that accompanies this Report shows the pipe system proposed.

From the pump house a main is to be laid to the main road, thence south-easterly along the main road to the G.T.R. subway.

I have included the following streets in my estimate of cost:—

Street.	From.	To.	Length.
Force Main	Pump House	G.T.R. Subway	2,800 feet.
Main	G.T.R.	Church	2,400 "
Main	Church	Denison	5,200 "
Cross	Church	Colter	750 "
George	Church	King	1,200 "
South Station	John	Southerly	300 "
North Station	William	King	800 "
North Station	King	Water Tower	1,700 "
Church	Main	George	650 "
King	George	Elm	1,550 "
Maria	North Station	Elm	800 "
John	Main	Elm	1,400 "
William	North Station	Elm	450 "
Dufferin	Main	Westerly	700 "
Sykes	Main	Westerly	450 "
Denison	Main	Westerly	550 "
Denison	Main	G.T.R.	500 "
Denison	G.T.R.	Easterly	1,000 "
Hydrant Branches			400 "
Total			23,600

When the streets upon which mains are not now shown are sufficiently built upon, the extensions of the system will become necessary, but I cannot recommend you to lay a pipe line when the revenue to be derived from consumers will not immediately warrant the expenditure.

COST.

I estimate that the proposed works will cost as follows:—

Land and Right-of-Way	$ 500
Intake into River	500
Pump House	3,500
Pumping Machinery	6,000
Sedimentation Basin	3,000
Filters and Filter Room	7,000
Pipe Distribution System	25,000
Water Tower	6,000
Services (100)	2,000
Sundry Expenses	500
Engineering and Superintendence	3,000
Total	$57,000

This total corresponds very closely with the amount expended for water works at Bridgeburg, Grimsby, Port Elgin and Oakville, taking into consideration the population and assessed valuation of the places, with this exception, that in Weston the cost of filters and filter house is an addition of $7,500.

REPORT ON GUELPH SEWAGE DISPOSAL WORKS.

By F. L. McArthur, City Engineer.

The sewer farm is situated just outside the city limits, in a south-westerly direction, along the Speed River, and contains in all about fifty acres of land. Nearly half of this area is good soil, and covered with scattered trees, while the remaining portion, farthest from the river, is rough and rocky. The river opposite the disposal works is about sixty feet wide, with an average depth of two feet six inches.

The septic tanks, as shown on the plans, have already been constructed, and are now in operation, giving splendid results. They have a joint capacity of 240,000 gallons. The flow of sewage reaching these tanks about mid-day is approximately at the rate of 1,250,000 gallons per twenty-four hours. There are now about 800 buildings connected with the sewer system. Assuming six people to each building, using 100 gallons per capita, this would represent 480,000 gallons of domestic sewage per day of average strength, or, at the outside, 500,000 gallons. It is evident, therefore, that more than half the flow of main sewer represents sub-soil water which finds its way into the system. I am satisfied that by gauging the flow accurately at various points, the leakage can be located and most of the sub-soil water diverted from the sewer.

The proposed filter beds, eight in number, will have a joint area of 4.63 acres. Each bed is to be a rectangle 210 feet long and 120 feet wide, and the filter material will be three feet deep, composed of three layers. The bottom course will be of screened gravel six inches deep. The idea of the gravel being screened is to make the drainage as nearly perfect as possible. The second course is to be of coarse sand and gravel two feet in depth, and the top course six inches of coarse sand. The main effluent drain will be of twelve-inch sewer tile. The branch lines to be of four-inch field tile and placed twenty feet apart.

The sewage will flow from the septic tanks by means of gravity through a main which passes along the embankment, separating the two rows of filter beds. Valve chambers will be situated along this main, one opposite each pair of beds, by means of which the sewage can be turned upon the different beds. A trough leading from the valve chamber out on to each bed distributes the flow evenly over its surface.

The filtrate will be collected by the under-drains, and discharged into a small creek which leads directly to the river.

The three embankments running nearly parallel to the river will be each twelve feet wide on top, with side slopes of one and a half to one. The one next the river will be constructed so as to act as a dam to keep back the river water in case of an extreme spring freshet. The embankments running nearly at right angles to the river and separating the filter beds will be six feet wide on the top, with side slopes of one and a half to one.

The small stream into which the filtrate is discharged may be easily diverted, and the land used for the construction of more filter beds should they be required.

REPORT ON SEWAGE DISPOSAL FOR PALMERSTON, ONT.

By John Galt, C.E.

In accordance with your instructions received in December, 1908, I have made a study of your local conditions in respect to an efficient sewage disposal system for Palmerston, and after investigating the subject thoroughly, both as to present conditions and with a view to possible future necessities, I beg herewith to present my conclusions and recommendations, accompanied by complete plans, illustrating my ideas and proposals.

Local Conditions Bearing on the Problem.

It will be in order to state briefly the situation at Palmerston and the local conditions, which have a bearing on the question of sewage disposal.

The population, according to the latest Government return, is 1,948. Local authorities estimate it to be somewhat larger than this, but for all practical purposes it may be taken as about 2,000.

The town is served in part by a sewer system constructed of about 9,000 feet of vitrified tile pipe, ranging in size from twenty inches diameter on the main outfall to ten inches diameter on residential streets.

The system is designed to take both house sewage and a certain amount of surface drainage, but up to the present time it has been used chiefly for cellar drainage, and for the purpose of draining surface water from the low-lying portions of the town site.

I have also found that 95 houses are at present contributing sink waste to the sewers, and the drainage from the G.T.R. shops and round house is also delivered to the sewers. About 30 catch water basins are provided on the streets to take surplus water during rains.

The various manufacturing concerns, viz., O'Mara's pork factory, L. H. Clark's malt house, Watt's oatmeal mill, and Meyer's flour mill, do not use the sewers, and, owing to lack of necessary fall, it is not likely that they will use them. Their drainage is now taken off in a northerly direction, and I therefore do not think it will be necessary to consider the presence of trade waste in the sewage, except that received from the G.T. Railway's round house and shops. This latter will probably carry very little waste matter, being largely the result of boiler washings very much diluted and having a certain amount of waste oil in it.

Palmerston is now supplied with a water system, comprising about 15,500 feet of water mains, which extend over the greater part of the built-up portions of the place. From the above it will be noted that the water mains cover about 70 per cent. more territory than the sewers at the present time, and it is to be expected that the future extensions of the sewers will be in the territory now served by the water works.

The outlet of the sewer discharges into a small stream which runs through a flat, marshy valley for three miles, to the point where it empties into a branch of the Maitland River.

The grade of the sewer outlet is only one and a half feet above the level of the water in this stream, and there is no natural fall at this point or elsewhere along the stream sufficient for the operation of complete sewage works. This will, therefore, have to be provided as explained later in this report.

POPULATION TO BE PROVIDED FOR.

This point was carefully investigated, and it was found that the sewers now laid serve 206 houses containing a population of 804 persons.

The territory served by both water mains and sewers has in it 269 houses and 1,137 people.

As previously stated, the extensions of the sewers will undoubtedly follow the water mains as at present laid, and it will likely be some years before this whole territory is sewered.

In my present judgment, therefore, I consider it will be sufficient at the present time to provide sewage disposal works of a capacity ample for 1,200 of the population, due allowance being made for the additions to the sewage flow resulting from the G.T.R. waste, storm water and surface drainage.

QUANTITY OF SEWAGE.

By gaugings made at the mouth of the outlet sewer it was found that the average flow now is at the rate of 100,000 gallons per day. Further investigations indicated that the total quantity was contributed from the following sources:—

G.T.R. round house	45,000	gals. per day.
House sinks	20,000	" "
Land drains	35,000	" "
Total	100,000	"

I have assumed that 1,200 people, when properly connected to the sewers, will contribute at the rate of 75 gallons per capita per day, an amount of domestic sewage = 75 x 1,200 = 90,000 gallons. Deducting the amount now contributed by them, viz., 20,000 gallons, the total quantity of sewage to be provided for by the works will be 100,000 — 70,000 =170,000 gallons daily. This sewage, being very much diluted by large quantities of water having little organic pollution, will in consequence be a weak sewage, carrying, I anticipate, about sixteen parts of suspended solids per 100,000 parts of sewage.

FALL NECESSARY FOR THE WORKS.

As has been previously pointed out in this report, scarcely any natural fall is available at the sewer outlet, and this will have to be provided in one of two ways, viz., either by pumping the sewage to higher ground adjacent to the creek, or by deepening the creek channel sufficiently to give enough grade fall throughout the works.

The plans for a drainage ditch through this territory, already submitted to the Council of Palmerston, have been studied relative to the requirements of the proposed works, and it is found that the depth of the ditch as proposed (viz., three feet) is not sufficient for the purposes of complete disposal works, and it will be necessary to deepen the last mile of this ditch and obtain at the sewer outlet a depth of cutting amounting to over nine feet. Comparing the two methods of operation, *i.e.*, gravitation or pumping, it is very evident that the deepening of the ditch is in the main by far the cheaper proposition. The cost of pumping plant and annual pumpage, capitalized at the usual rate of interest, would be greatly in excess of the annual interest on the expenditure made in deepening the ditch.

I therefore advise you to deepen the ditch as shown by the revised grade on the profile referring to this part of the scheme.

The calculations of the comparative cost are based on a ditch three feet wide in the bottom and having one and a half to one slopes on the sides. It is possible that the ditch would stand with one to one slopes, but the flatter slopes would doubtless be the most satisfactory in the end, and it has accordingly been adopted as the basis for the estimates of this part of the works.

Disposal Works.

The creek which will conduct the effluent through three miles of farms before it empties into the branch of the Maitland River, maintains a small flow of water during the greater part of the year, but in the summer seasons sometimes becomes nearly dry.

The water of this creek is, I understand, used by the residents along its banks for the watering of stock. For that reason, and also from the fact that the flow of the Maitland branch is not large and would be easily polluted by sewage, it is evident that your disposal works should procure a sewage effluent both organically and bacteriologically pure. To obtain this result I propose to pass the sewage first through liquefying tanks; secondly, through intermittent sprinkling filters; lastly, through a sand filter.

The works are designed on the basis of a daily dry weather flow of 170,000 gallons, made up as follows:—

Domestic sewage	90,000
Trade effluent, G.T.R. shops	45,000
Farm drains	35,000
	170,000

Owing to the large amount of dilution from the G.T.R. and farm drains this will be a weak sewage, and I have estimated that about three-quarters of the G.T.R. sewage and all of the farm drains may be allowed as dilution, leaving practically 101,000 gallons as requiring nitrification by the filters. The works are calculated to take care of an amount of storm water equal to three times the dry weather flow.

Description of Works.

The sewage will first enter a screening chamber 10-ft. x 10-ft. x 8-ft. deep. This chamber is provided with a screen to keep back inorganic solids and refuse. It then passes into a storm overflow chamber, provided with iron pipe, permitting all storm water over and above three times the dry weather flow to pass to the storm water basin. The excess storm water, after it has settled in the basin, is permitted to flow out into the creek.

The sewage up to three times the dry weather flow is passed into the liquefying tanks.

Liquefying Tanks.

The tanks have a capacity of 170,000 gallons, or one day's dry weather flow, each having a capacity of 85,000 gallons. They are in duplicate, to permit of cleaning and repairs. The floor is sloped, having eight feet of sewage at the inlet and six feet at the outlet. This is for the purpose of keeping the sludge concentrated at one end, from where it may be removed partly with sludge drains and partly by sludge pumps.

They may be operated as continuous flow, sedimentation tanks or as septic tanks.

If as the former, sludge must be removed frequently; if as the latter, sludge should be removed at periods of about four months.

When septic action is maintained, it is estimated 25 per cent. of the organic solids will be digested.

Percolating Filters.

The effluent of the tanks is distributed on to three sprinkling filters, each being forty feet in diameter and five feet deep, and collectively having a total of 700 cubic yards of filtering media. They are calculated to take the sewage at the rate of 145 gallons per cubic yard per day, and in this due allowance is made for three times the dry weather flow during periods of rainfall.

The discharge to the filters is controlled and regulated by a dosing chamber and syphon. This chamber is 10 x 6 x 1-ft. 6-in. deep, and permits regular and equal quantities to be discharged on the filters, of an amount equal to two gallons per square yard of filter. This appliance is to prevent over saturation and the occurrence of hydraulic head, which would tend to flush the filters. The sewage will be distributed by three revolving sprinklers, operated by the sewage under a head of 1-ft. 6-in.

It is anticipated that these revolving sprinklers cannot be operated successfully during the coldest weather of the winter, and I have provided an alternative method of distribution for that period. As shown by the plans, the sewage will be taken through a second set of pipes and distributed through open-jointed three-inch tile placed about six inches under the surface of the bed. The filtering medium will be composed of hard burning clinker, ranging in size from half to one inch, the outer circumference to be sloped up with larger pieces of the same material.

Collecting drains of three-inch open-jointed tile will be placed on the concrete floor and radiating to the collecting channel. A retaining wall is provided about the sprinkling filters, adjacent to the tank, permitting all the pipes, valves, etc., to be placed underground and thus protected from frost. For the purpose of aeration the filters themselves are left exposed, but should the need arise, temporary winter coverings could be easily provided with the proposed arrangement.

The above process should produce an effluent free from organic matter and non-putrescible. It is not calculated, however, that many of the bacteria will be removed, and the effluent will be biologically unfit for the use of man or cattle. Further treatment is, therefore, considered to be necessary.

SAND FILTER.

I propose to remove the bacteria by passing the effluent from the sprinkling filters through a sand filter.

As there is insufficient fall for downward filtration, submerged or upward filtration is advised. By this method the liquid will be conducted to the bottom of the filter by a special chamber, and be directed up through graded sand to the outlet, and delivered into the creek. The bottom of the filter bed will be laid with coarse material, allowing the liquid to spread uniformly over each section. The sand will be above this, and above the sand coarse gravel will be used to keep the sand in place. The filter will be 103-ft. x 30-ft. x 2-ft. 6-in. deep, and is calculated to work at the rate of two and a half millions per acre daily.

The walls and bottom will be of water-tight concrete, and the top provided with a movable wood cover built in sections. This cover will be used in winter to keep out frost, and removed whenever weather conditions will permit. The effluent resulting from the combined processes can be discharged into the creek, and should be free from all organic pollution or pathogenic organisms.

STORM OVERFLOW.

At certain seasons an excess of storm water over and above the amount designed for the disposal works will overflow at the overflow chamber. The dilution at such periods will be so great that this overflow will carry very little sewage, and it might perhaps with safety be delivered directly to the stream, but it will probably be better to arrest it for treatment.

In many sewage plants the storm overflow is spread upon the land and allowed to filter through the soil. The sub-soil at Palmerston being blue clay, with very little loam upon it, does *not* favour this method. Under the circumstances, I would advise settling the excess storm flow in a large sedimentation basin, with a capacity of 500,000 gallons, before emptying it into the creek. This basin could be excavated in the clay, and would not require any concrete. The lower end should be provided with pipe and valve, to facilitate draining at the proper time. The basin could at any time in the future be made into a roughing filter, by filling the excavation with coarse filtering media, should the storm flows require a more complete treatment.

SLUDGE DISPOSAL.

It is now an acknowledged fact that liquefying tanks, when operating at their best, will accumulate about 25 per cent. of the organic solids of the sewage, as well as a certain amount of grit and detritus not arrested by the screening chamber. The removal of this deposit or sludge from the tanks and screening chamber requires that some special provision should be made for this purpose, and also for the proper disposal of the sludge itself.

As there is very little fall on the site of the works, it will not be possible to drain much of the sludge from the bottom of the tanks through pipes. Pipes and sludge valves, however, are provided, which will admit of lowering the head of the sewage in the tank to some extent, at the same time driving out a portion of the sludge from the bottom. It is likely that the major portion will have to be removed by pumps or other method.

It is important that the sludge removed should not be deposited in the stream or elsewhere where it will be a nuisance and danger. Sludge beds have been provided close to the septic tank, upon which the sludge must be deposited, where it will drain and become, after a short period, of such consistency that it can conveniently be hauled on the land as a fertilizer.

The bed is divided into compartments containing coarse gravel underlaid with drains. These drains lead to a sump well, from which the drainage from the beds is pumped back to the tank to proceed through the regular course of purification. The drains from tanks and screen chamber deliver on to the sludge beds. The sludge, on drying sufficiently, can be dug out of the beds and used for tillage. It is considered that two compartments of the sludge bed will be sufficient for the first installation, and the estimate for it has been made accordingly.

General Remarks.

The amount of land required for the work as shown upon the general plan is three and a half acres. Sufficient has been taken to admit of duplicating the works at some future time. In the mean time the spare land can very well be used for tillage, using the sludge from the tanks for fertilization. Very little of the excavated materials will be needed for banking or mounding on the works, owing to the fact that the level nature of the site puts all the work in excavation. In consequence, a portion of the excavated material will have to be removed from the site, and it may be profitable to provide sufficient land to deposit this upon and thus save extra expense entailed by carting the material for some distance.

From a study of the plans and the site it will plainly be seen that the first important work of construction towards the installation of the disposal works will be the deepening of the drain from the branch of the Maitland River to the site of the works. Until this is accomplished, no work on the system proper can be economically carried out, owing to the saturated condition of the ground. The deepening of the ditch will require some time, as the last mile alone, on which the grade will be lowered with slopes at one and a half to one, will require the excavation of 17,000 cubic yards of material. With slopes at one to one on the sides it will require the excavation of 12,000 cubic yards of material.

In the estimate of cost we have taken the extra cost of excavating the last mile as the total cost less the cost of ditch first proposed. Both ditches are assumed to have slopes at one and a half to one on the sides, and to be three feet wide on the bottom.

In the estimated cost of the works, which is herewith appended, I have considered the various parts of the work in detail, and all usual expenses have been taken into account. The system has been designed to perform the work of purification thoroughly, and necessarily must be somewhat expensive owing to the lack of natural conditions which would favour the construction of an efficient and proper works.

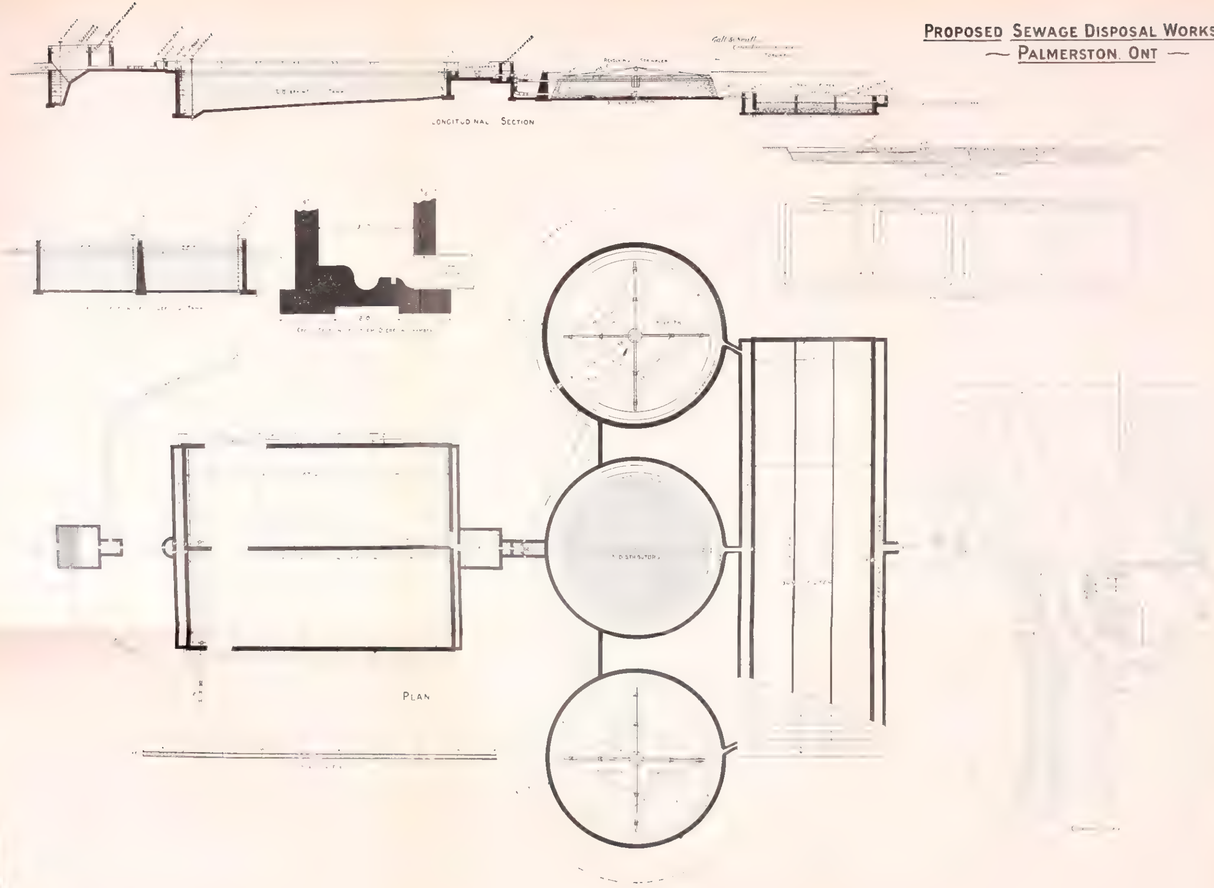
I trust the report and plans will be clear to you, and I shall await your further wishes in the matter.

Summarized Estimate of Cost.

1. Sewer Manhole and connecting sewers at manhole	$ 36 00
2. Screening Chamber	155 00
3. Overflow Chamber	46 00
4. Pipe connection	5 00
5. Liquefying Tanks	2,787 60
6. Dosing Chamber	52 00
7. Syphon Chamber and Syphon	43 00
8. Valve and Pipe Chamber	40 00
9. Sprinkling Filters, Piping and Distributors	4,361 00
10. Sand Filter	2,483 00
11. Sludge Beds	300 00
12. Storm Water Basin	1,028 00
13. 3½ Acres of Land, at $75.00	262 00
14. Deepening Drain	2,200 00
	13,798 60
Add 15% for contingencies	2,069 40
	$15,868 00

Excavation and Extras	[illegible]00 00
	$23,915 80

PROPOSED SEWAGE DISPOSAL WORKS FOR
— PALMERSTON, ONT —



REPORT ON PROPOSED IMPROVEMENTS OF THE SEWAGE DISPOSAL PLANT OF THE CITY OF STRATFORD.

BY M. FERGUSON, B.SC., C.E.

I beg to submit plans for the improvements to the sewage disposal plant and an estimate of the cost of same.

The first question which had to be considered was which method of purification should be adopted.

Sand filtration and chemical precipitation are both impracticable, the first as there is no sand in the neighbourhood and we have not sufficient land at our disposal, the second on account of the cost.

This narrows the question down to contact beds and percolating filters. Contact beds have been in operation here for some time and have not been a success; to continue with this system we would require to increase the area of the present contact beds nearly three times. In recommending the sprinkling system I am not recommending an experiment, but one that has been thoroughly tested and has been found to give the necessary purification.

The present tanks have the necessary capacity, but need to be repaired. The smaller tank No. 1 at the south end will be used as a pump well. This will necessitate the inlet being closed and a syphon put in from No. 2 tank. The object is to keep the sludge at the bottom from being stirred up and entering the pump. From this pump well the liquid will be pumped through an 18-inch pipe to a storage tank shown on the plan, from which it will be distributed by gravity to the different beds. The capacity of storage tank will be 104,707 gallons, or 2½ hours' flow. The bottom of the storage tank will be at an elevation of 61, the tank is ten feet high, the sewage will be delivered to the distributors in the filter at an elevation of 55 with a 4½-foot rise, thus giving 11 foot of head. At the tank there are three gates, one to each of the pipes leading to the beds, so that any of the beds can be shut off and given the necessary rest.

There are three main distributors from the storage tank to the beds. Each of these main distributors has five laterals on each side, ten in all per bed, each of which is controlled by a valve, so that the head to the sprinklers can be increased or decreased, and thus giving more equal distribution over the filtering material. The sprinklers have a 4½-foot rise with a nozzle; they are placed 15 feet apart. The filters will be working at the rate of 140.6 gallons of sewage per 24 hours per cubic yard of filtering material. The beds all have a slight fall towards the centre, to allow of the effluent being carried off readily. The lateral collector is underneath the distributor, and they will both be built in concrete.

To prevent clogging the lateral distributors are carried to the surface, so they can be flushed out. A pipe line from the river is laid as shown, and to the hydrant a hose can be attached for flushing purposes.

In regard to tertiary treatment I have made allowance in the estimate for a settling basin or tank for chlorine, which can be put in later should we not get the necessary purification.

The system as proposed will treat one and a half million gallons. The present flow is about 950,000 gallons, and in our plans we have figured 25% more than is necessary at present; this will allow for increased population up to 20,000.

To overcome the effects of severe winter weather on the sprinklers I propose to carry pipes from the boiler to the storage tank and allow the exhaust steam to be carried around the tank; in this way the liquid can be heated 10° to 15°, so that it will go through the sprinklers warm and prevent any freezing around the nozzle.

ESTIMATE OF COST.

Concrete Floors and Walls in Filter Beds	$4,083 20
Tank	1,414 00
Walks	469 00
Excavation	1,009 40
Broken Stone	12,444 25
Piping, Sprinklers and Drainage	2,095 95
Boiler	600 00
Pump	500 00
Pump House	800 00
Excavation and Extras	500 00
	$23,915 80

ANNUAL COST.

Depreciation of Pumping Plant, 10% of $1,100	$ 110 00
Labour, 1 Man for engine	700 00
Labour, 1 Man for engine	550 00
Fuel	2,500 00
	$3,860 00

APPENDIX A.

The reports appearing in this Appendix were received from the Secretaries of the different Local Boards of Health of the cities and towns of the Province, in conformity with section 60 of the Public Health Act, and have been edited by the Secretary of the Board.

BRANTFORD.

DR. T. G. PEARSON, M.D., M.H.O.

With the closing of the year ending October 31st, 1909, I wish to present you the following report:—

MORTUARY STATISTICS.

For the period of this report, there have occurred, exclusive of still-births, 270 deaths, as compared with 314 for the corresponding period of last year, which in the estimated population as taken from the assessors' report of 20,711, gives us a mortality rate of 13.03 per thousand, to my mind a very satisfactory showing.

Among the causes of death there were:—Typhoid fever, 5; diphtheria, 3; pneumonia, 18; tuberculosis, 15; entro collitis and cholera infantum, 20. Ast to ages we find: Under 1 year, 65; over 1 year and under 5 years, 10; over 60 years, 54; over 80 years, 30.

CONTAGIOUS DISEASES.

Of the above class of diseases there have been reported in all 121 cases, with 9 deaths, as compared with 122 cases with 9 deaths for the preceding twelve months. Classified as follows:—

DIPHTHERIA.

Thirty-five cases with 3 deaths as to 24 cases with 2 deaths for the corresponding period of the preceding year.

Of these cases 7 were due directly to outside sources of infection, while 5 others occurred from infection from an unreported mild case.

SCARLET FEVER.

Of this disease we had 16 cases with no deaths as compared with 15 cases and no deaths of the preceding year. As with diphtheria, we were unfortunate in getting a great deal of our trouble from outside infection, four cases at least having been exposed in other places, one of which having returned from an infected house in another city, became responsible for no less than four other cases before the source of infection was discovered.

TUBERCULOSIS.

In reference to tuberculosis you will note that we had 15 deaths as compared with 26 deaths for the previous year; and although a decided reduction yet the deaths from this disease are more than the combined deaths of all other contagion, and although ways and means have been discussed by this Board on different occasions as to the combating of this trouble.

I had hoped that at this meeting I would be able to have something definite to give you as to the establishment of a sanitarium, but am sorry to state that as yet matters are somewhat delayed but hope in the near future that the committee in charge will have details completed, and that by spring something will be done in the way of construction and thus put us in the desired position for caring for this class of patient.

TYPHOID FEVER.

During the past twelve months 65 cases of typhoid with 5 deaths have been reported, as against 72 cases with 7 deaths for the year previous.

From this number no less than 14 cases with 3 deaths were directly traceable to outside sources of infection, such as persons who had returned after a summer at holiday resorts or those who had been at work outside the city and who returned home ill.

As to the remaining cases, as in former years, they were located largely in the outlying sections of the city and located in those sections which are as yet without proper sanitary sewers, and where the water supply is largely from wells.

In this connection I might add that in regard to water supplies we find that 20 were from wells, 22 from wells and city, and 9 city water users. It might further be stated that, as would be apparent from the above conditions, upon examination of their different wells the water in almost every case showed evidence of sewage.

Another factor which also is to be considered from the above where there is an absence of proper sewers and the dry earth system of closet is in vogue the danger of direct infection becomes very apparent from the activities of the house-fly, which I think in not a few cases was the cause of trouble.

Therefore it again behoves us to continue an active campaign of sewage extension, at the same time a progressive abolition of all wells which, if not now, must soon become infected, through the long pollution of soil and increased density of population.

Public Abattoir.

Another matter which we have on different occasions discussed has been the advisability of establishing a public abattoir in which the proper slaughtering and inspecting of meat used in the municipality could be carried out, and without going into the many details of the necessity of such an establishment I wish to call forth your united action on the matter and would advise that a committee of this board be appointed to take the matter up with the City Council, who I think are quite prepared to take up the proposition.

CHATHAM

W. R. Hall, M.D., M.H.O.

I have the honour to herewith submit my annual report for the year ending December 1st, 1909.

The Local Board of Health held eleven regular meetings during the year. The chairman, J. C. Wanless, attended 9 meetings; Dr. R. V. Bray and Mr. W. R. Baxter, each 10 meetings; Dr. C. R. Charteris all meetings; Rev. Colles 6 meetings; His Worship Mayor Westman 6 meetings. There were no special meetings.

Expense Incurred.

Total charged up to the Local Board of Health $1,431.56. This included the total up-keep of the Isolation Hospital, and a sum of $148.08 for permanent improvement to that institution. Deducting this last item from the local expense, the actual running expense this year is $1,267.48, or $52.72 less than last year.

Contagious Diseases.

Diphtheria, 20 cases; two deaths. Last year there were 24 cases.

Scarlet Fever, 14 cases; no deaths. Last year there were 4 cases.

Whooping Cough, 16 cases reported; two deaths.

Typhoid fever, 19 cases; two deaths. It is known that seven of these cases were contracted outside of the city and were brought here for treatment. We cannot find the cause of the other cases. Last year there were 47 cases, with 4 deaths.

Consumption, 11 deaths; this disease is not reported, only registered when death occurs. The Local Board of Health disinfects every house in which a death occurs, as soon after as possible. Fourteen deaths were reported from this disease last year.

Vital Statistics.

There were registered in the city 188 births, 131 marriages and 170 deaths; 47 of these latter died in the city, but were brought here from outside points, the correct number for the city being 123. Taking the estimated population at 12,000 gives the birth-rate 15.6, marriage-rate 10.9, and the death-rate 10.2.

AGES AT DEATH.

Still-born and premature-births 20; between birth and 2 months 16; between 2 months and 1 year 11; between 1 and 5 years 9; between 5 and 20 years 10; between 20 and 50 years 38; between 50 and 70 years 31; between 70 and 80 years 15; between 80 and 90 years 18; one 90 years and one 95 years.

SOME CAUSES OF DEATH.

Consumption 11; cancer 9; pneumonia 13; heart disease 18; apoplexy 12; convulsions 2; alcoholic poisoning 2; accidental 2.

GARBAGE SYSTEM.

The collection of garbage is done without any expense to the city. Householders have the privilege under the by-law to make contracts with the city scavenger at a fixed rate, and pay him for the work. Two hundred and seventy householders have availed themselves of the privilege this year, seventeen more than last year. The system works pretty well and should be extended.

The city scavengers buried 162 dead animals; cleaned 147 yards and 1,144 closets.

Five lots of hogs were moved outside of the city limits by order of the inspector.

Four lots of meat were condemned and destroyed by the inspector's order, and one vendor fined $5 and costs for exposing meat for sale which was not considered fit for food.

There are eight slaughter houses used for slaughtering animals for butchers' use in the city. These have all been inspected a number of times and found in a fair condition, except that the water used for washing the carcases was in four cases found to be too impure for this purpose. In one case this has since been remedied, and we hope to have the others remedied soon. In the meantime precautions are being taken to overcome the danger.

We have under observation a number of lump-jawed animals in the Townships, which if offered for sale on our market will receive prompt attention. Two animals of this kind were destroyed at our request during the year.

MILK SUPPLY.

The dairies supplying milk to the city have all been inspected twice during the year, and the majority three times. There has been a marked improvement in many of the dairies during the year. There is still room for much improvement, but we are hopeful for the future as the dairymen realize more than ever the necessity for thorough cleanliness, etc., in the handling of the milk.

Fifty-five samples were analysed. The majority of them were found to be pure and of good quality. Two samples had water added to them.

GUELPH.

H. O. HOWITT. M.D., M.H.O.

Taking it all in all we have a fairly satisfactory report for this year.

Deaths.—One hundred and ninety-nine deaths occurred in Guelph during the twelve months ending December 31, 1909. Of these 199 a considerable proportion were not Guelph people, but patients who came into the city hospitals or Homewood Sanitarium for treatment.

It will be noticed in tabulating the deaths into the decades of life:—1st decade, 67; 2nd decade, 6; 3rd decade, 6; 4th decade, 12; 5th decade, 18; 6th decade, 9; 7th decade, 27; 8th decade, 25; 9th decade, 26; 10th decade, 4.

The second and sixth inclusive bear a relatively small individual proportion; the seventh, eighth and ninth bear a heavy proportion, and the tenth, as few reach that age, is very low.

The greatest number of non-residents who died in Guelph are included in the third and sixth decades, which are also low. The first is the heaviest proportion (e.g., 67 in number) and is made up entirely from this city's population. It claims 33.7 of the total 199. Now of these 67, 59 whose age was less than two years and from two years and under we reckon the infant mortality. Then 59 of the 199 or 29.6 percentage of the total is quite a large infant mortality, but 18 of these were reported (still-born) of our infant mortality percentage of total is 20.6 per cent., and 9 of these died of pneumonia.

The chief causes of death were: Pneumonia 19, cancer 13, tuberculosis 8; six deaths were accidental or "found dead." Alcoholism claimed 1 (a non-resident), typhoid 1, and scarlet fever 2, one in June and 1 in December, before this disease became general

SCARLET FEVER.

There were reported during the year ending December 31st 20 cases of diphtheria and 62 cases of scarlet fever; only during eight weeks of the fifty-two were the fever wards empty. The largest number of cases of scarlet fever at one time are not included in this report, as they occurred early this year when it was necessary to open an extra building to accommodate them, this building being at considerable inconvenience supplied in time of the emergency by the Sisters of St. Joseph.

At present in the infectious department of the General Hospital, the "city isolation hospital," the conditions are deplorable. There is not accommodation properly for more than nine cases of each disease, allowing a cubic air space of only 1,000 cubic feet per patient. There is no accommodation provided for mixed infections, cases of erysipelas and rotheln and for diseases requiring isolation. There is no provision for private cases or cases requiring special attention or even making it possible for the segregation of the sexes, men, boys, girls, women are only provided for by one large room and one common lavatory. This arrangement for looking after infectious fevers made eighteen years ago was perhaps quite suitable then with our small population, but is entirely inadequate now. Fortunately after September 1st of this year the infectious department will be closed, complying with the order of the Provincial Inspector of Hospitals. The Public Health Act empowers each municipality to provide accommodation for infectious diseases. It will be necessary then for the City Council of Guelph to take immediate action and provide a suitable hospital for these cases. This hospital will probably cost, if made modern, in the neighbourhood of $15,000 to $20,000. The maintenance and cost of construction are entirely in the hands of the City Council and in no way connected with the General Hospital. The Board of Directors of the General Hospital have, however, offered free of cost a site for this building and also to provide nurses when required, in return for the city grant. It will probably be much less expensive for the city to make an arrangement of this kind than to have a nursing staff of its own and to provide the site for themselves.

TYPHOID FEVER.

Typhoid fever is not always reported so we cannot get satisfactory figures as to death rate. Perhaps the best way to arrive at this percentage is to take an average of the number of cases treated in the two hospitals during the past few years and then noting the difference, if any, compared with the year just closed. Now this makes a particularly interesting report at present. When we consider that typhoid fever is a water borne disease, and the city in June, 1909, installed a new water system, namely, direct supply from the springs; river water (with filtrations?) was used formerly. In 1908 there were thirty cases of typhoid treated in the hospital (dozens were treated at home in the fall of that year). The Guelph hospitals reported 30 cases treated in the fall of 1908 and 14 in 1909 during the same months. Now of these 14 in 1909, three came from one house with a mixed water supply, in six the disease was contracted out of town, leaving only five cases as compared with thirty of the previous year during the same months or one-sixth. Some of these five probably owe their infection to some cause such as infected water other than city water. Those who used well water produced an overwhelmingly relative proportion of the cases of typhoid in 1909; and the disease is now when we have our largest population about one-third as prevalent as when the city had a population of about 11,000. The new water system has done much to wipe out the disease.

COMPARATIVE TABLE.

Showing cases of Typhoid Fever reported for the past twenty-two years.

	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Total.	Deaths.
1887–1888	14	10	5	.....	.....	2	.....	1	4	23	48	20	127	19
1888–1889	44	11	2	4	2	2	1	2	6	24	38	20	151	12
1889–1890	5	10	3	6	2	4	1	3	1	7	26	15	81	6
1890–1891	14	8	5	2	1	1	1	4	3	2	15	13	69	5
1891–1892	8	5	2	1	4	4	3	5	2	15	21	9	79	10
1892–1893	11	5	7	5	4	2	2	1	.	3	13	12	65	6
1893–1894	23	11	4	2	3	2	2	1	10	14	29	19	120	6
1894–1895	3	2	5	5	3	.....	2	6	4	15	17	31	93	4
1895–1896	13	8	25	7	8	2	4	3	14	13	14	8	119	15
1896–1897	8	3	2	2	31	.....	.....	2	1	5	11	6	41	5
1897–1898	2	11	1	2	4	1	.....	1	1	4	6	3	36	6
1898–1899	3	1	1	1	1	3	1	.....	5	26	21	12	75	13
1899–1900	5	2	.....	1	2	1	2	1	1	10	28	8	59	12
1900–1901	12	5	1	.....	.....	.....	.....	2	2	13	12	11	59	10
1901–1902	3	2	1	1	2	1	.....	3	2	17	29	3	64	7
1902–1903	5	1	2	3	1	1	1	.....	.....	13	9	17	53	67
1903–1904	16	5	2	.....	2	3	1	20	19	12	17	7	104	7
1904–1905	6	11	3	.....	.....	1	3	1	2	7	8	6	48	8
1905–1906	7	4	7	3	.....	1	.....	2	2	6	52	47	125	20
1906–1907	12	1	.....	2	.....	1	.....	4	1	8	15	8	52	11
1907–1908	2	4	.....	1	.....	.....	.....	2	6	11	13	4	43	9
1908–1909	7	.....	.....	.....	3	.....	.....	3	4	6	27	8	58	.....

SMALLPOX.

Two cases were reported during the year, one who had nursed a case in another town and developed the disease a few days after arriving in Guelph. The cases were placed in the infectious hospital and their houses quarantined. Recovery in both cases and the total cost of handling the scare about half that of any previous case.

MILK.

A very satisfactory milk by-law has been passed by the Council regulating the inspection and sale of milk; it will immediately be put into force.

I regret the present legislation is not sufficiently exact to enable us to regulate the meat supply and make a municipal abattoir a success, but we have the promise of the Ontario Government Commission, which visited Guelph last fall, that they will recommend to the Government the passing of an Act granting that which is now so much required.

ANALYSES.

Old Water Supply.

1. Analyses, former supply (from river).

Chlorine		*Free Ammonia.*		*Albuminoid.*
1.55 parts per million	....	.013	....	.15

Bacteria—Colon Bacilli present.

2. Present water supply (from springs direct).

Chlorine		*Free Ammonia..*		*Albuminoid.*
.9	....	merest trace	....	.038

Bacteria—Complete absence of Colon and harmful bacteria. The water supply at present is unexcelled anywhere.

HAMILTON.

JAMES ROBERTS, M.D., M.H.O.

(Morbidity and mortality statistics of contagious disease.)

Summary of contagious and infectious diseases from November 1st, 1908, to October 31st, 1909.

Diseases.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Total.
Scarlet Fever	35	31	32	28	26	27	29	27	25	35	32	29	356
Diphtheria	15	17	17	12	16	8	9	11	7	15	24	31	182
Typhoid Fever	7	....	....	....	3	....	....	3	4	6	27	8	58
Measles	2	1	3	1	2	4	14	21	11	2	3	5	69
Mumps	....	....	....	2	...	....	1	1	...	....	....	....	4
Chicken pox	32	46	30	16	30	44	28	7	4	1	1	6	242
Whooping Cough	3	....	6	3	6	17	22	20	16	9	19	2	123
German Measles	1	....	1	5	1	....	4	....	....	....	1	1	14
Tuberculosis	6	5	7	1	18	6	15	10	7	7	5	5	92
Smallpox	....	....	....	....	....	....	....	....	....	....	3	...	3

Table showing number of cases and deaths from Infectious Diseases for the past twenty-five years.

Year.	Diphtheria.		Scarlet Fever.		Typhoid Fever.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1884–1885	202	59	27	1	52	4
1885–1886	214	67	109	2	25	2
1886–1887	205	31	173	2	69	8
1887–1888	163	48	173	3	127	19
1888–1889	62	15	151	3	151	12
1889–1890	45	6	175	6	81	6
1890–1891	32	8	108	3	69	5
1891–1892	20	23	135	2	79	10
1892–1893	55	15	282	2	65	6
1893–1894	318	69	134	2	120	6
1895–1896	60	9	48	1	119	15
1896–1897	63	17	180	3	41	5
1897–1898	159	18	187	6	36	6
1898–1899	95	15	124	4	75	13
1899–1900	103	12	141	4	59	12
1900–1901	93	25	88	4	59	10
1901–1902	106	25	97	23	64	7
1902–1903	86	13	104	7	53	6
1903–1904	180	13	218	3	104	7
1904–1905	218	22	129	3	48	10
1905–1906	180	21	162	1	125	20
1906–1907	146	14	68	2	52	11
1907–1908	92	8	171	8	43	9
1908–1909	182	....	356	....	58	......

NOTE.—1894-1895 is omitted.

KINGSTON.

A. R. B. Williamson, M.H.O.

In presenting this the Annual Report of the Medical Health Officer, I am able to certify to the condition of public health only for the past two months, from personal experience, as I was appointed to this office late in the month of September, and most of the work of the year was superintended by my predecessor in office. However, in going over the records for the year a few facts were brought prominently to my attention.

1. That the unfortunate smallpox epidemic which interfered with the welfare of the community so seriously, both from a physical and material standpoint last fall and winter was by May 1st completely wiped out, and the only cases reported since then were in the month of May and were brought here from outside places.

2. The distinct advance in sanitary legislation adopted by the Board last year in closing up all pits in the portions of the city supplied with water and sewerage systems.

A close watch has been kept on the various wells in use in Kingston, and any found infected have been ordered to be closed. I think that in a city situated like Kingston, so close to an abundant and pure water supply the necessity for wells is a minus quantity, but at the same time the municipality must be prepared to supply pure water to every householder, before taking away his right to use a well, and this matter should be urged on the City Council, as it seems to me that the provision originally adopted, demanding a return of 8 per cent on capital expenditure for the putting in of a water system in any district is not now so necessary as when the city took over the plant, and if the rate of interest demanded can be lowered, we would be able to have the wells in a number of districts closed up, where at the present time it is a practical impossibility to do so owing to lack of water supply in the neighbourhood.

Closely related to the water supply is the necessity for connecting the dead ends of the water mains in Kingston. Apart from the mechanical advantages that have been pointed out in favour of such a scheme, it is undoubtedly true that liability to disease from infected drinking water is greater at these points where sediment can collect in the pipes, and from a sanitary point of view the elimination of dead ends is greatly to be desired.

I would further suggest that the local Board should urge on the Council the necessity for working on some general plan in the construction of new sewers, as any marked increase in population will render an intercepting sewer with an outlet far from the shore a necessity, and therefore as little money as possible should be spent on the present outlets, as there is no doubt that their usefulness will be limited to a comparatively short space of time. There are, however, one or two that require immediate attention; one is the Russell Street sewer and the other the Bay Street. Attention to these has already been called and provision of some sort for their improvement will no doubt be adopted very shortly.

The total cases of infectious diseases reported for the last twelve months are:—Scarlet fever, 36; typhoid fever, 55; diphtheria, 12; smallpox, 13; chickenpox, 2; measles, 5.

Of these the following cases were brought into the city from outside points:—Scarlet fever 1; Typhoid fever 15; Smallpox 3; leaving a total of Scarlet fever 35, Typhoid fever 40, Diphtheria 12, Smallpox 10, Chickenpox 2, and Measles 5, contracted within the city during the year.

LONDON.

T. W. Hutchinson, M.D., M.H.O.

I beg to submit the following report regarding the health of the city for the year ending November 15th, 1909:—

Sixty hundred and thirty-nine deaths occurred during the year, being fifty-five less than in 1908. Consumption for the first time in many years has fallen back to third place. There is a very satisfactory decrease in the number of deaths, namely, forty, as compared with fifty-one in 1908. This is due no doubt to the more strict isolation and the destruction of the sputa, the Anti-Spitting By-law, the knowledge by the public that the disease is contagious, and in great measure to the noble and self-sacrificing efforts of Miss Graydon, Mrs. Duncan and a few other ladies who have for the last two years taken charge of nearly all the chronic cases. Cancer, which has been steadily increasing for years, not only in the city but in the province, has this year jumped to first place, the mortality reaching the large number of forty-nine. Pneumonia takes second place with forty-five deaths, compared with fifty-four last year. Pneumonia thrives in winter because people get less pure air and sunshine than in summer; therefore ventilate and sleep with the bedroom windows open. There is also a great reduction in the number of deaths from infectious diseases. As to scarlet fever there were reported forty-seven cases with only one death. Diphtheria, forty-seven cases reported and two deaths; and Typhoid fever had but one death to its credit compared with five last year. No doubt all the cases of Typhoid fever are not reported on account of the difficulty of diagnosing cases of very mild type. Typhoid fever dwellings are not placarded, but it is earnestly desired that every case be reported to the Health Department, in order that means may be taken to restrict the disease as much as possible. There were fifteen deaths due to violence, compared with twenty-six last year. Three of these were railroad accidents, two died by poisoning, and two suicides. There were only three deaths from Appendicitis, which speaks well for our splendid hospitals and surgeons. Altogether the year has been an exceedingly healthy one. Taking the city's population at 50,000, places the death rate at 12.8 in the thousand of population. Of the dead approximately four hundred and twelve were Canadians, one hundred and sixteen were born in England and Wales, eighty-one in Ireland, thirty-one in Scotland, twenty-one in the United States, three in Germany, two in France, and one in each of the following countries, namely, Russia, Denmark, and Newfoundland; one from Auld Scotia reaching the good old age of one hundred years and three months. The records do not show that he used tobacco all his life.

There were eighteen cases of smallpox during the year, compared with ten in 1908, and as usual, none of these had been successfully vaccinated. All recovered. In 1885 a coloured porter travelling between Chicago and Montreal was found ill with smallpox. For a number of years the French-Canadians had opposed and neglected vaccination. From this one case thousands contracted the disease. It spread through the city like fire, and in ten months three thousand one hundred and sixty-four died from the disease; two thousand seven hundred and seventeen of these being children under ten years of age. The saddest phase of this is that innocent children suffered and died through the ignorance of their parents who had followed false teaching and neglected vaccination. The epidemic cost Montreal $70,000, and ten times that amount in loss of trade and wages. Every few years a wave of fanatical ignorance and opposition to vaccination passes over some part of the Dominion, followed in due time by an invasion of smallpox. Cease vaccination and London will have Montreal's experience.

Public telephones should be frequently disinfected. Every person using a telephone breathes and speaks into it, and if there are any disease germs in the throat, they readily lodge in the transmitter. The Department is frequently asked to disinfect telephones. This may be done daily, or as often as necessary, by wiping the mouthpiece with a cloth saturated with a solution of formaldehyde. It is earnestly hoped that the efforts now being made for a garbage system will be successful. A clean city means a healthy city. This would make it impossible for the disease-carrying house-fly to exist. The fly eats and walks over manure, tubercular sputum and worse filth, then comes into the house and deposits this on the food. Typhoid fever and Consumption are undoubtedly spread in this manner by this filthiest of all living things.

There are 66 authorized milk dealers in the city, who dispense over 13,000 quarts daily. This quantity is supplied by 120 farmers. There are also a number of cows belonging to citizens, who use the milk for their own families. The city's milk regulations are strict but fair. Amongst others, it requires that all dairies must comply with certain regulations before a license shall be issued, and prescribes a standard of not less than 3.25 per cent. of butter-fat. Bottled milk should not be left at quarantined houses, but should be poured into a receptacle provided by the family. Any unfavourable discovery should be reported immediately to the Health Department. One hundred and sixty-five samples of market and other milk have been examined during the year. The quality was good; the average per cent. of butter-fat by which this is determined being 3.87. Cows suspected of having Tuberculosis or any other disease whatever were either removed or kept under observation, or the vendor prohibited from selling milk in the city.

NIAGARA FALLS.

F. W. Ernest Wilson, M.D., M.H.O.

During the year ten meetings of the Board were held, and $424.98 expended in this Department. Sixty-eight contagious diseases were reported, from which fourteen deaths resulted. The inspector placarded all houses for contagious diseases and did the necessary fumigating.

Scarlet fever: 35 cases, 1 death. Diphtheria: 7 cases, 1 death. Measles: 2 cases, 0 deaths. Typhoid fever: 14 cases, 2 deaths. Tuberculosis: 10 cases, 10 deaths.

The total number of deaths from all causes was 113, or 8.8 per cent. of total deaths from Tuberculosis alone.

Early in the year the Board secured the services of Dr. G. D. Porter, Organizer and Lecturer of the Canadian Association for the Prevention of Tuberculosis, who delivered a public lecture in the City Hall on February 23rd, when much interest was manifested in this subject and plans set in motion to form a branch of the League. Later, this was followed up by requesting the Department to set a date for holding the Tuberculosis Exhibit in the city in the hope of bringing before the citizens the enormity of the ravages the White Plague is making in our midst.

The Sanitary Inspector made two general inspections of the city during the year and found fifty premises in an unsanitary condition, all of which were promptly cleaned, upon the parties being notified.

The population from the last assessment roll 8,200.

The births during the year numbered 202.

A system of garbage collection has been established whereby all kitchen refuse is collected once each week from all parts of the city, and twice each week from hotels and restaurants; other garbage once each month, which has added materially to the general health of the city.

The water supply has been very satisfactory, most of our typhoid fever cases being traceable to outside sources.

Three thousand nine hundred and nine feet of sewers were put in and 63 house connections made.

Three general inspections of milk were made by the Dairy Inspector, and samples taken from the wagons making deliveries averaged 3.6 per cent. of butter fat.

OTTAWA.

Robert Law, M.D., M.H.O.

I beg to present the report of the Health Department for the year ending 31st October, 1909.

The estimated population for the year is 83,360.

During the year 1,727 births were recorded, a decline of 252 from last year, which totalled 1,979.

During the year 1,307 deaths were recorded, giving a death rate of 15.67 per thousand, a decline from last year, when the deaths totalled 1,412 or a rate of 17.58 per thousand; thus indicating the steady improvement in the health of our city, which, eight years ago, had a death rate of 20.9 per thousand.

Cases of infectious diseases were reported as follows:—Diphtheria, 170; scarlet fever, 204; typhoid fever, 51.

The mortality from the chief infectious diseases totalled 184, divided as follows:—Tuberculosis, 128; typhoid fever, 26; whooping cough, 19; diphtheria, 11; scarlet fever, 5; measles, 1.

The increase in deaths from Tuberculosis from 107 to 122 seems to emphasize the urgent need of the splendid institution so soon to be opened, on a most excellent site, for the treatment of this dread disease.

The thanks of the city are certainly due to the public spirited men and women who have banded together and given freely of their time and means to provide this refuge for the stricken, and great defensive aid in the struggle against this tireless and most insatiable invader.

To increase the power for good of this hospital I would again recommend that you urge the *Provincial Board* of Health to, at the earliest possible moment, have *definite* and *comprehensive* regulations passed for the control of this disease, especially emphasizing the necessity for *notification* of cases to the Health Department, and the conferring of the necessary authority to require the removal to a *proper institution* of such cases as cannot be treated in their homes without *endangering* others.

As the debilitating influence of life in crowded and unsanitary dwellings and workshops is an important predisposing cause of this, as of other diseases, and as the increased area of the city has rendered the demand upon the Plumbing Inspector excessive, I again recommend that an assistant be appointed, and that these inspectors constitute the House Inspection branch of the Department, and be required to look into general unsanitary condition and overcrowding of buildings, with authority to have defects remedied.

The Isolation Hospital has done good work during the year in the care of scarlet fever and diphtheria, affording treatment to 369 patients, with a total mortality of 12, or but 3.25 per cent.

During the year extensive alterations and innovations have been carried out, which will greatly facilitate the work of the hospital.

Of the total mortality of 1,307, 448, or more than one-third, are of children under one year of age. Many of these lives could have been saved.

During the three summer months 108 children succumbed to diarrhœa, as compared with a total of twenty from the same cause during the remaining nine months of the year.

This question of excessive infantile mortality, especially during the summer, is a matter to which your Board should give especial attention, as many lives may be saved each year by education of parents in the care of children, by the issuance of a short pamphlet on this subject, and by the provision of especially prepared milk in bottles ready for use, during the warm weather. The details of this proposition have been already before your Board.

The city of Rochester, N.Y., one of the pioneers in this work, has, at an annual outlay of $1,000, reduced the summer mortality in infants by 50%.

That this would be considered a good investment by the citizens I do not doubt, as I believe one dollar spent along this line will save more lives than one hundred dollars spent on the combined services of scavenging, incineration and water purification, all of which have been practically endorsed by the electorate.

As another aid toward saving of child life and improved health of school children, I would recommend that provision be asked in your estimates to inaugurate a system of medical inspection of school children.

I also beg to mention the question of a municipal ice supply, which I think might well be taken up in conjunction with the inquiry into means for the rendering of our water supply above suspicion.

This, I believe, should be a civic service, as much as is the water supply.

This could readily be done in a city like Ottawa, where the cold winter makes the ice so readily obtainable, and where the short hot summer makes it so necessary for the health and comfort of our citizens.

In conclusion, I have much pleasure in testifying to the faithful services of the staffs of the office and hospital during the year.

PETERBOROUGH.

A. W. McPherson, M.B., M.H.O.

I beg to submit a report of the Health Department from June 9th, 1909, to December 31st, 1909.

During this time the city has not been free from infectious diseases. In the months of June, July and August, scarlet fever and smallpox were very prevalent, with an occasional cases of diphtheria, measles and chickenpox. Since then all have steadily decreased with the exception of measles. At present there are no cases of smallpox or diphtheria, and only three families with scarlet fever. Measles, however, have increased very greatly, but as it has not been the custom to report them, it is impossible to estimate the extent. Typhoid has been very light, and at present the city is free from it. Tuberculosis is not reported, and, as with measles, we are not in a position to judge as to the number of cases.

Smallpox.

To the mildness of the infection is due the fact that there was a widespread exposure before the disease was recognized. The prompt action of the Board in establishing tent accommodation and providing free vaccination soon controlled the epidemic. There was one feature worthy of notice I should like to draw your attention to; out of over forty cases only two had been previously vaccinated. In these the exposure was very close and the type was very mild. I would recommend that steps be taken to provide public vaccination at stated intervals, as is required by law.

Scarlet Fever.

Fortunately the type has been of a mild character. But in spite of this we regret to report several deaths and many serious complications resulting directly or indirectly from it. I wish to draw your attention to the great difficulty in enforcing proper quarantine as a result of the long period required for scarlet fever and the resulting inconvenience and loss to the families affected. The great majority of cases are among a class who can very ill afford such loss. However, I am glad to say that we hope before the next annual we shall have an isolation hospital and these inconveniences will be minimized.

Reporting of Infectious Diseases.

It has been the custom to report only cases of scarlet fever, diphtheria and smallpox. Several months ago the Board requested the doctors to report all cases of typhoid. I would recommend that a similar request be made for measles, whooping cough and tuberculosis, so that such steps can be taken to limit the spread of these diseases among school children and others who may be exposed.

WATER SUPPLY.

Samples of city water and samples from a number of wells were sent to the Laboratory of the Provincial Board of Health on two different occasions. The first report showed slight contamination of the city water. About six weeks later the report showed no contamination. The absence of typhoid speaks well for the purity of our supply.

MILK.

The monthly tests have been very satisfactory as far as butter fat and adulteration are concerned. Two cases of the latter were reported and the offenders punished. With the exception of one month, the percentage of butter fat was high. But the examination does not reveal the presence or absence of dirt in the milk, and for that reason some steps should be taken to inspect the premises of the dairymen and a certain standard of cleanliness required before a license is granted.

GARBAGE.

Numerous complaints have been received about the unsanitary conditions of the lanes and back yards, due to the deposits of decaying vegetable matter and other material. In following up these complaints we found the lanes in many places in a very untidy and, oftentimes, unsanitary condition. This means that in the near future a scavenger department will be required. In towns not any larger than ours such a department exists, and collections are made twice weekly. This would materially improve the health and beauty of our city.

PORT ARTHUR.

C. N. LAURIE, M.D., M.H.O.

In presenting my report for the year 1909, it gives me much pleasure to be able to state that we have had no serious outbreaks of sickness.

The typhoid season, which has just ended, has been the mildest, with the least number of cases from the city, that we have had during my five years as Medical Health Officer. We have only twenty-two cases reported.

There has been a large number of cases treated in our hospitals from the surrounding country, the most serious outbreaks being at Jackfish, Kashabowie and Nepigon from the Transcontinental. As most of the cases in this district are sent to Port Arthur and Fort William for treatment, these outside cases are of particular interest to us, as they are likely to bring the disease to our citizens, especially when they are treated in private homes. In the hospitals, where the nursing and care of the disease is better understood and applied, the danger of contagion is small.

The only way to overcome this danger is to have the outside district most carefully looked after by Provincial officials before an outbreak occurs—not after, as is now the case; also by issuing pamphlets to educate the people on the causes, prevention and care of typhoid.

The three great causes of this disease are impure water, bad milk and flies. I believe I should have put the flies first as a cause. Of course the flies cannot carry the disease or the typhoid germs unless they can find them, which they generally do in the filthy open closets which are still so common; after wading through the filth they fly into the house, crawl over the butter and other victuals, fall into the milk, soup and tea, from which they may be fished out, but leave the germs behind. I was called to see a sick child last August; the house was clean and bright, and everything looked well kept, but I found seven flies swimming in the milk from which the child had been fed. On my pointing them out, the lady of the house took a spoon to fish them out, but never thought of throwing out the milk or even trying to purify it by boiling.

As far as the city water is concerned, we need not consider it as a source of infection at all, as there is no better or purer water in the world.

Water used from wells and springs on the outskirts of the city is always open to suspicion, and will always be a source of danger. However, we hope the day may soon come when the water works system may be in use all over the city.

The milk problem is still a hard and dangerous one. It is always one which needs to be watched, as the most of the supply is brought into the city from the surrounding country, where they of necessity have to use well or spring water to water the cattle, wash cans, etc.

Some of the milkmen even use it for the purpose of adding to the milk. We have had several fined during the year for so doing, and some have been fined several times. One milkman actually acknowledged that he got the water out of a creek on the roadside.

At first the milkmen objected to the inspector visiting their premises, but the threat that they would not be allowed to sell milk in the city brought them to their senses, and a general improvement has taken place in all the dairies.

In regard to the supply of city water, we are now using Current River water while the intake pipe is being moved from the present location, necessitated by the building of the dry dock at Current River.

The changing of the intake, which was in fifteen feet of water fifteen hundred feet from the shore, now being carried out to thirty-five hundred feet into water thirty feet deep, should put our water supply beyond all possible source of danger for many years to come.

We have had a little trouble with some of the butchers this year, but after having a few before the magistrate there has been a decided improvement, and I believe the shops and meat are kept as clean as any in the country.

I advise that more care be taken by the bakeries in the handling of bread, each loaf of which should be covered by paper, as it has all to be handled by the driver, whose hands cannot always be as clean as desired.

Inspector Nichols has kept a close watch on the lanes and yards of the city, and although the work is getting greater each year, he has kept the sanitary condition of the city in as good a state as possible with the one regular and few temporary teams at his command.

The Isolation Hospital has been in charge of Mr. and Mrs. Clemerson, who have kept it in an excellent condition. A number of cases of measles, scarlet fever, diphtheria and one case of smallpox have been treated there. All the patients have expressed themselves as much pleased at the cleanly, comfortable quarters and care provided by the city.

It is rather startling to notice nineteen deaths from tuberculosis. Most of these cases occurred among the foreign population, and I think, to a large extent, is caused by the overcrowding in their homes and boarding houses. In a great many cases two and three families live in one house, and in a number of boarding houses there are two and three beds in one room.

This is a matter the Board will have to take up during the coming year, and demand all boarding houses to have sufficient cubic feet of breathing space for each person in their sleeping rooms.

In October I visited the American Public Health Convention at Richmond, Virginia. There every possible phase of public health work is most fully taken up by men and women who spend their whole time and attention to it. A number of excellent papers were read and discussed. It is a great education and stimulus to anyone in that line of work to attend such a meeting, aside from the pleasure of the trip, which was certainly great.

ST. CATHARINES.

F. King, M.D., M.H.O.

I beg to submit my second annual report on the sanitary and other conditions of the district for the year ending October 31st, 1909.

A glance at the tabulated matter as received from the Registrar will show the number of births, deaths, contagious or infectious diseases reported.

Under the head of vital statistics there were recorded during the year 249 births and 193 deaths. Of these premature or still births number 25, an increase over the previous year and a somewhat high percentage.

Of the total number of deaths amongst children there were: Under one year of age, 28; one to five years, 4; five to ten years, 1. An improvement as compared with previous years.

Of contagious or infectious diseases there were reported; Smallpox, 4; scarlet fever, 18; typhoid fever, 18; diphtheria, 17; whooping cough, 1; measles, 15.

Of the total mortality preventible diseases are accountable for: Scarlet fever, 0; tuberculosis, 16; diphtheria, 0; measles, 12; typhoid fever, 2; smallpox, 0; cancer, 10.

The death-rate per thousand of the population, as recorded by the Government Statistical Department, is placed at 18.1 per cent., being lower than that recorded in previous year.

These figures are those of the Provincial Government, and are based on the geometrical progression as found to have prevailed in the previous intercensial period. This system is that adopted by all Governments having decennial enumeration of the people, and while not always absolutely correct, except for the year the enumeration takes place, it has been found by experience to be the only reliable plan to follow. The popular saying that figures "do not lie" does not always hold good in statistics of this kind. When it is so desired, they may be made to say anything.

It is gratifying to note a substantial decline during the year of preventible diseases. Of the 18 cases of typhoid fever recorded, 15 are reported by the hospital to have been contracted in outside municipalities and sent here for treatment. These cases should have been, and probably were, reported at the place of contagion.

It is also gratifying to note that deaths from the ordinary contagious or infectious diseases of children was nil.

I beg to notify the Board, however, that while the form of scarlet fever prevailing during the past few years has been of a very mild type, there has lately appeared in Western New York, including the city of Buffalo, a much more virulent form, and as a consequence the disease has been more fatal, as proved by the increased ratio of deaths therefrom.

It is noteworthy that the majority of preventible diseases occur in those congested sections of this city unprovided with sewers, and where the malodorous closets and cesspools are in universal use.

SANITATION.

It is satisfactory to record the general sanitary conditions of the city improved, due in part to the establishment of a garbage system, which may be imperfect and possibly expensive, the natural result of a new innovation; nevertheless, it has had the effect of cleaning out and keeping clean many dirty spots.

It is to be hoped that a system for "cleaning up" the whole city may be established in the near future.

A stricter supervision of all premises by the Sanitary Inspector, together with frequent notices for the removal of filth heaps, has also been a factor of this good work.

There is still much to be desired, and, as pointed out in last year's report, there exists no authorized system for the cleaning and disinfecting of the 2,000 vaults and cesspools in use, but much more work of this kind has been done under the direction of the Inspector, with beneficial results, and many vaults on streets provided with sewers have been abolished.

The so-called offensive trades have received attention. The keeping or storing of rags, bones and other refuse, heretofore a prolific source of complaint, has been placed on a more satisfactory basis, and the premises used for this industry are kept in a much more sanitary condition than heretofore.

I consider it in the best interest of the public health that industries of this kind should not be licensed, unless the buildings used therefor are situated at least 100 yards distant from the premises of any school; that no hogs shall be kept in the congested sections of the city, nor in any other part except in pens situated 50 yards from any school or dwelling-house, and 25 yards from any public street; that all stable manure should be moved weekly or oftener, or kept in a screened portion of the stable and treated, after each addition, with air-slacked lime.

THE FOOD SUPPLY.

The general characteristics referred to in last year's report, to a great extent, still prevail.

THE SLAUGHTER HOUSES.

The slaughter houses are still unsanitary, as are also the conditions under which much of the meat supply is produced.

A Committee of the City Council recently inquired into and reported on this important question, from which it is only necessary to note that upwards of 80 per cent. of old milch cows suffer from tuberculosis alone.

Since writing the above I learn that on Saturday, November the 27th, nearly three tons of inspected beef, bearing the Government Inspector's "Official Stamp," was brought into this market for local sale from the large city abattoirs, from which it is natural to infer that the general public are demanding this class of meats; if the latter sentiment is correct, the trade will supply the demand and the public can control the situation.

THE BAKERIES.

The most objectionable features observed and reported, as found at some of the bakeries last year, have been removed or improved. One on Geneva Street, however, should receive this Board's supervision.

THE MILK SUPPLY.

The conditions governing the milk supply, referred to in my last report, still exist as regards the unsanitary state of the cow byres. Little or no improvement may be expected until legislative action amends the present law.

The Ontario Government Milk Commission visited this district a short time ago; the conditions observed did not impress the members favourably. It is to be hoped that their report, when submitted to Parliament, may result in good.

The adoption of a milk-testing system has had the effect of improving the nutritive value of this supply, *i.e.*, its value as a food, and its delivery to the consumer at a lower temperature. The efforts of the Board, however, should be supplemented by assistance from the general public; every housewife should demand a clean, cold article, and should report any unfavourable condition observed.

Ninety-six samples of milk have been examined. The first test showed that only one sample contained the percentage of solids and butter fat required by the by-law, and some were found to contain as little butter fat as 1½ per cent.

The second test showed great improvement; two-thirds of the samples were above the standard of the by-law, and all showed a higher percentage of solids and fats.

The third test showed one-half of the samples examined to be of the standard required.

Milk should contain 12 per cent. of solids, this being made up of 3½ per cent. of butter fat, 4 per cent. sugar of milk, and 4½ per cent. of proteids.

Where the solids fall off the per cent. of water is increased, and while it is possible that the cow may sometimes put water in the milk through faulty feeding or other causes, it is more probable that the water too often comes from the cow with the iron handle.

One sample of milk and several samples of cream examined, produced the chemical reaction found when formaldehyde is present.

The above tests resulted as follows:

1st test—The average per cent of butter fat was 2.40 p.c.; lowest, 1½ p.c.
2nd test—The average per cent. of butter fat was 3.81 p.c; lowest, 3 p.c.
3rd test—The average per cent. of butter fat was 3.33 p.c.; lowest, 2.25 p.c.

I again repeat that the municipality granting the license to vendors should also have the power of controlling the milk supply, irrespective of the place of domicile of the vendor.

I again beg to draw the attention of the Board to Clauses 3 and 4 of the city By-law No. 885, and the provisions therein.

During the past year several cases of poisoning by foods such as cheese, cream, ice cream, candies and other confections have been reported; the symptoms were those of ptomaine poisoning. Bacteriology, unfortunately, has not yet reached that state of perfection through which the particular micro-organism causing the trouble can be isolated; under the existing law it appears impossible to get a conviction for the selling of such impure articles of diet. The general public, however, have the matter to a great extent in their own hands.

The Isolation Hospital.

The experience of the past year has demonstrated the necessity for a properly equipped and managed Isolation Hospital. The present institution cannot be said to meet the requirements of a modern home for contagious or infectious diseases, or for the treatment and care of this class of afflictions.

It would be of interest to know the cost of each public patient admitted. I have not been able to procure the data necessary to compute this amount, but recommend that the Committee of Management or the Executive Committee of the Board take up this important question.

The School.

It only requires a glance at the children going to or returning from school to cause the onlooker to realize that there exists an imperative necessity for the authorities to carry out the mandate as set forth in the Public School Act in regard to the inspection of the schools and pupils.

The best authorities on school hygiene hold "that it is in the highest degree incumbent upon the school authorities to provide the best attainable conditions, not only to protect, but to promote the health of the pupils committed to their care." At the present day, theoretically, the protection of the child's health is provided for by many laws and regulations, which in practice are ignored or neglected.

The chief reason for this discrepancy between the ideal and the real is a lack of observation. Parents and trustees do not recognize that eyesight is being impaired, normal growth prevented, blood poisoned, and the body starved because the hours of school life are so often unhealthy and abnormal. "School buildings are erected with a view to economical or exterior effect; an adequate system of heating and ventilating and a proper site pronounced too costly."

It is a common complaint that classrooms are overcrowded, and that too many pupils are assigned to a teacher, with the result that every additional pupil injures those who are already there and receives injury himself.

Vital statistics plainly show that wherever the measures for the prevention of disease are observed, the spread of those diseases is checked and the mortality reduced.

The school, because it assembles children from different homes and brings them into close contact, becomes a medium for the spread of disease.

The newer knowledge of the specific causes and propagation of contagion imposes a duty upon school authorities to exercise every care, lest the schools become agents in spreading disease. Regard for individual rights requires that no child should be exposed in school to infection or contagion if, by taking precautionary measures, such exposure may be avoided.

It should be remembered that the health of the child during the school years of its life determine, to a great extent, that of its future.

With reference to the sanitary and hygienic work for the future, I beg to refer the Board to the remarks of the speakers at the recent meeting of the Public Library Association, held in this city.

STRATFORD.

J. A. Robertson, M.D., M.H.O.

Considerable progress is being made towards the establishment of an Isolation Hospital, and it is to be hoped that the same will be completed in the near future.

It would be well for you to try and formulate some scheme for the removal of garbage; such is becoming a necessity.

I am pleased to state that the health of the city during the past year has been exceptionally good. There were in all 139 deaths, which, according to our population, made our death-rate a fraction over 9.26 per thousand.

From the so-called preventible diseases only seven deaths occurred—two from diphtheria, three from typhoid fever and two from whooping cough. Heart failure heads the list, there being 23 reported as having died therefrom. Pneumonia comes next, 14 having died from it. There are only three reported as having died from consumption, quite a diminution from previous years. Only four are reported to have died from old age.

On the whole we have much to be thankful for in our comparative freedom from contagious diseases during the year.

WINDSOR.

J. A. Ashbaugh, M.D., M.H.O.

In making a report this year I am not giving you any statistics, as Mr. Lusted includes that in his report. However, there are some things which I wish to draw your attention to, recommendations that have been made in previous reports.

The care of the garbage and alleys, as I have said before, could be better and more cheaply done by turning the whole matter over to the Board of Works. There are many reasons for this. In the first place, in doing it by contract it is simply impossible to keep the city clean for the amount of money paid the contractor. There should be more teams and men put on, and I feel quite satisfied that under the supervision of the Board of Works we would get much more satisfactory results both to ourselves and to the public.

Another question which is being taken into consideration, I believe, by the Finance Committee is the appointment of a competent Veterinary Surgeon, whose duty it will be to inspect dairies and cattle which supply the city with milk. Other duties which he should perform would be the inspection of meats exposed for sale in the city. I think that this is due to the public, and would be very much appreciated. I am enclosing you a report of the milk analysis, which I find, with the exception of a few cases, is up to the standard quality.

Another matter I mentioned three years ago was in reference to a by-law advocating the proper protection of foods exposed for sale. As you know, in many cases merchants will expose foods without any proper covering that are subjected to dust, dirt and oftentimes worse, and I think we should insist on them being properly covered and protected.

In regard to the question of water supply, there are many things to be taken into consideration. The river front, from Walkerville up to the Lesperance road and beyond, is rapidly being built up, and the sewage is increasing from year to year. The thousands of boats passing up and down stream are doing their part to contaminate the water. This is practically unavoidable. Therefore, in my opinion, the advantages to be obtained by taking the intake further up would in no way compensate for the large expense. I firmly believe that the solution of the difficulty, which will perhaps be accomplished later on—I do not consider there is any urgent necessity at present—will be a sedimentation basin and filtration plant.

The general health of the city at present I consider unusually good. We only have at the present time three cases under quarantine, and conditions throughout the past year have been such that the general health has been very good. We have practically had no epidemics, and at present I fear nothing serious.

I wish to compliment Mr. Grieve and Mr. Hillier, our two inspectors, for their faithful attention to the duties prescribed to them, and assure you that they have been of great assistance to me in carrying out the health regulations.

WOODSTOCK.

A. McLay, M.D., M.H.O.

In accordance with the provisions of the Public Health Act, I beg to submit the following as my annual report *re* the health of our citizens and the sanitary condition of our city for the year ending November 15th, 1909.

I am pleased to congratulate you on the health of our citizens during the year. No epidemic visited us, and the number of what may be termed preventible ailments have been comparatively few, doubtless due in a great measure to our healthy surroundings, excellent water supply, well-graded streets, cement sidewalks, well-kept premises, and the active co-operation of a great majority of our citizens with your Board in sanitary matters.

Scarlet fever, measles, diphtheria and typhoid fever were sporadic, few in number as compared with some of the past years. Only 12 cards for scarlet fever, 10 for measles and three (3) for diphtheria were put up during the year, thus indicating the benefit of prompt isolation.

The managers of our factories and business places are to be congratulated on disallowing anyone exposed to contagious or infectious ailments to work therein.

Only one quarantine card is up at present.

We had three outbreaks of smallpox during the year, one case in December, 1908, three in March and nine in July, 1909, two of a severe type. No deaths. In no case was the ailment allowed to spread from the place where it was discovered. Vaccination was enforced. I am pleased to say that it was a complete success. It is too late in the day to consider proper vaccination a debatable question. Early diagnosis, prompt isolation, and vaccination are our safeguards. I would recommend a more rigid enforcement of the Vaccination Act, and that all children previous to attending school be vaccinated; also that two rooms be added to the Isolation Hospital, in order to provide proper accommodation for a medical attendant and nurse when such are required. And that the city water be installed in the building.

I would again recommend that you favour the grouping of two or more contiguous counties, with a view to the securing of a "Sanitarium" for the comfort, treatment and isolation of consumptives. Such an institution is much needed, especially by the poor, as under the present conditions they cannot be properly cared for.

Our Provincial Government has provided considerable financial aid for the erection and maintenance of such an institution.

Would again draw your attention to the necessity of draining and grading the lanes in the rear of our business places; by so doing would add to the comfort and health of those occupying buildings abutting thereon.

Our scavengers have done fairly good work during the year. Our system is far from perfect and must be remedied. Official dumping grounds are a necessity.

Herds, byres, water supply and cooling stations were inspected twice during the year by our Veterinary Surgeon. His reports were very satisfactory, and indicated that our milk supply came from a good source. I would recommend that his reports be sent to the Health Department.

Milk was tested monthly; the quality was good and none came below the minimum standard. Only two complaints reached me during the year.

Number of deaths during the year, 108, a fraction over 10 per 1,000—a very low mortality.

The mortality amongst the aged was high; 33 died between 70 and 89, the average being 77.

The mortality amongst the young was very low, only eight dying between the ages of four days and eleven years.

Number dying from—	
Old age	13
Tuberculosis	8
Bronchitis	3
Pneumonia	12
Heart disease	8
Rheumatism	4
Cancer	3
Paralysis	4
Pleurisy	1
Diphtheria	1
Pernicious anemia	3
Apoplexy	1
Typhoid fever	2
Meningitis	3
Peritonitis	2
Convulsions	3
Cholera infantum	3

In conclusion, permit me to say that Woodstock has the reputation of being one of the most beautiful and healthy cities in the Province. Let us endeavour to retain it.

Reports of Medical Health Officers in Towns of 5,000 Population and Over.

(As received by the Secretary.).

BARRIE.

A. T. Little, M.D., M.H.O.

In presenting my report for the year 1909 as Medical Health Officer I have to congratulate you on the increased interest being taken in sanitary matters; and also the improvements being made in our sewerage system in its extension work will add greatly to the health of our citizens.

There has been an increase in the number of contagious diseases reported, notably that of scarlet fever. Typhoid was also prevalent during the late summer and fall months. Many of the cases, however, came from the adjoining townships and northern towns. Most of these cases received treatment in the Royal Victoria Hospital. Treatment of typhoid in our hospital prevents the infection of other members of the household, and should be encouraged by our local authorities.

In all 46 cases of scarlet fever were reported, with two deaths. Typhoid claimed five deaths. Whooping cough, one death.

Our so-called Isolation Hospital is quite inadequate for reception of patients, owing to its location, lack of sanitary arrangements and modern conveniences. The Sanitary Inspector has endeavoured to keep it in a proper condition, but without success, as it appears to be the lodging place for tramps and other undesirables. I would recommend that it should not be re-rented, but that its place be taken by a cottage hospital, which could be erected and equipped at a small cost. As the present building costs the municipality over $120 per year, and the cost of opening it for the reception of patients would be an additional expense, the additional cost of erecting a small modern building would be very small. The nursing staff of the Royal Victoria Hospital might be utilized.

The inspection of the town has been well looked after by our Sanitary Inspector, who has been most assiduous in the discharge of his duties.

The recent milk by-law passed by the Council will enable us to carry our inspection of dairies out of the town, and will be a safeguard to our milk supply.

Our town dairymen have shown a great improvement in the manner in which they handle milk to their customers.

Our town water continues to be pure, as shown by the several samples submitted to the Provincial Board of Health.

A more stringent by-law should be enacted prohibiting the placing of cesspools, etc., in undesirable quarters; also to compel parties to connect their houses with sewers wherever practicable.

BERLIN.

J. McGillawee, M.B., M.H.O.

I beg to submit the Medical Health Officer's Report for the year 1909.

With the exception of those caused by whooping cough, the number of cases of infectious diseases has been small. An epidemic of whooping cough, which spread over the town, appeared in the early part of the year and continued during the summer.

Eleven deaths have been reported caused by whooping cough and its complications.

There were nine cases of scarlet fever. Three of these cases were in the Berlin Orphanage. The institution was put to a great deal of inconvenience on account of there being no place to which the infected children could be removed. No deaths from scarlet fever.

Three cases of diphtheria. No deaths.

Two deaths were reported from typhoid fever. There is no record of typhoid cases, but from what I can learn the number has been few compared with other years, and the majority of the cases were light.

Seven deaths are reported caused by tuberculosis.

BROCKVILLE.

A. J. Macauley, M.D., M.H.O.

In making my annual report I beg leave to state that the number of contagious diseases reported has been unusually small, there being only two of diphtheria, ten of scarlet fever, six of chickenpox, and two of measles, with one death from scarlet fever.

Of infectious diseases the number is unfortunately greater, there being fifty-seven cases reported, with three deaths, due directly or indirectly to typhoid.

While the cause of the outbreak has been undoubtedly traced to the town's water supply, many samples having been selected at different times from various sources and many of such found suspicious, no definite remedy, except boiling, has yet been reached, although the matter is now in the hands of a Sanitary Engineer and we hope soon to have a favourable report from him.

There has been a greater number of milk tests made during the year, and on the whole they have been very satisfactory, although, in a few instances some were suspicious; for the latter part of the year they have been very satisfactory.

Our hospital for smallpox is now completed and furnished, and could be put in readiness for occupation in a few hours.

The number of deaths reported during the year is 152, and the number of births 217.

COBALT.

C. H. Hair, M.D., M.H.O.

Typhoid Fever.—During the spring and early summer months an occasional mild case of fever broke out, but the epidemic from which we suffered began in the early part of August, the cases reported from the 1st of August in town and township being 1,102, and were as follows:—

Cases sent out of town (adults)	146
Cases in Red Cross Hospital	421
Cases in Municipal Hospital (two children)	88
Cases in town (adults)	351
Cases in town (children)	96
Total	1,102

Number of deaths 67, and were complicated as follows in twelve instances: Eight with diphtheria and septic throat, one acute tuberculosis, one sarcoma of the face, two complicating child-birth.

Therefore deaths with the usual complications were 55, or 5.08 per cent., or about 6.08 per cent. including the complications, which is a very fair or even low death rate.

In view of the fact that so many cases were treated outside of the hospital, and as there is no sewerage system, I fear we may expect cases to occur next spring and summer unless the season is favourable, a strict sanitary inspection kept up and a thorough disinfection made.

I would therefore recommend that all closets be kept thoroughly cleaned and that lime be supplied to the scavengers to sprinkle in abundance around the old earth closets

Scarlet Fever.—There were no cases of Scarlet Fever.

COLLINGWOOD.

D. McKay, M.D., M.H.O.

I herewith submit to you my Annual Report of the Health Department of the town of Collingwood, for the year ending October 30th, 1909.

The number of births—188.

The number of deaths—117. Twenty (20) of the 117 were non-resident, 8 were still-born, 13 old age, 1 accidental drowning, 5 tuberculosis, 6 typhoid, and 21 children under two years. Thus you will note that after deducting the still-born, old age and accidental drowning, that the actual number of deaths from disease, to residents of our town, was about 10.5 per thousand (taking the population to be 7,000), which is comparatively low.

I wish to congratulate the Council on the passing of the Plumbing By-law, which, I believe, is having good effect and undoubtedly will assist in the health of the town. I hope your Council will soon complete the by-law regulating the sale of milk, the examination of all dairies, etc. In this connection I wish to call your attention to this fact that we have had 21 deaths in children under two years. Faulty feeding will account for many of these deaths. Milk is undoubtedly one of the very best nourishments we can possibly have, if pure, and a disease producer, specially in children, if impure. The sources of these impurities are unhealthy cows, dirty udders, filthy stables and barn yards and unclean dairy utensils. And these impurities are further increased by the germs rapidly multiplying by leaving it in a warm place after being milked. Every housewife knows good milk and should demand a pure, clean product. If it has dirty settlings, get after the milk man. Notice his wagon, the way he protects the milk from the sun and the general cleanliness with which he handles his product.

I also wish your Council would consider the establishment of a public abattoir. Meat is one of the staple articles of diet, and if diseased will undoubtedly propagate disease to man. There are many diseases which may gain entrance into our system in this way, but the one we dread the most is tuberculosis. The only way to be sure that all meats offered for sale are free from disease and wholesome is to have all animals examined by a competent inspector while being slaughtered.

I have tested the milk regularly and found it nearly always to be up to the standard of butter fat and purity.

The town water has been regularly tested by the Provincial Board of Health, and no impurities have been reported.

We have had several cases of typhoid, though not nearly so many as last year. Quite a number of these were from out of town, especially from up the lakes. If all people were particular about cleanliness in their homes and surroundings I am quite convinced that typhoid would be very much lessened. We have had very few contagious diseases, and when any have come under my notice they have been promptly placed under quarantine. I am pleased to say that the local physicians have always shown promptness in reporting such cases. I would appreciate any complaints about suspicious cases of contagious diseases, such as scarlet fever, smallpox or diphtheria. Sometimes, the holder, owing to the mild case, does not employ a physician, and possibly the child, after a short interval, continues to go to school. These are the cases that are the causes of epidemics.

I am pleased to thank the Chairman, members of our Local Board of Health and Sanitary Inspector for so cheerfully giving their time and assistance in all matters of public health.

GALT.

T. W. Vardon, M.D., M.H.O.

In making this my annual report for the year ending October 31st, 1909, I am pleased to say that the health and sanitary conditions of our town have been almost all that could be desired during that period.

The total number of deaths from all causes including still-born were 125, while the number of births was 170. There have only been two deaths each from diphtheria and typhoid fever and eleven deaths from tuberculosis. The total death rate, deducting the still-born and those who died in the hospital from outside places, is only a fraction of ten per thousand of our population.

With the exception of a few scattered cases of diphtheria and scarlet fever, we have not had anything serious to contend with.

In all cases where any disease such as Diphtheria, Scarlet Fever and Tuberculosis were reported, the premises have been thoroughly disinfected. The public buildings, churches and schools are in nearly all cases connected with the sewer, and said buildings are in a good sanitary condition.

The Swiss Cottage has been improved by having a cement foundation put under it and chimneys erected thereon, it still requires to be rough-casted on the outside and painted, which I hope may be accomplished next spring.

The milk tests made during the year show that in nearly all cases the butter fats have been up to or over what is considered normal milk, viz., 3.5 of butter fats. I am pleased to say that a number of our milk dealers are now delivering the milk in bottles, and I hope that the remaining ones will soon adopt this method.

A garbage system for the town is now well under way of organization, and I hope by the spring that it will be accomplished and in operation.

I would recommend the Council to pass a by-law licensing Laundries and Restaurants that they may be under the supervision of the Board of Health.

There have been 132 permits taken out during the year for connecting with the sewers, it is imperative that all those who live on the lines of the sewer should have their premises connected thereto forthwith—both from a sanitary standpoint and and also as the sanitary contractor is having difficulty in finding a suitable place for the disposal of night soil. The depositing of raw sewage and other obnoxious materials into streams and rivers must cease, and there can be no good excuse offered where the sewer passes the premises of those who are disobeying the law.

It may seem a financial hardship for those who live on lines of sewers to make connection therewith, but as in all reforms sacrifice has to be made, and in the case where the health of the public is concerned, to say nothing of the convenience and benefits derived by those concerned, this sacrifice should be made willingly. Thanking you, gentlemen, for your loyal co-operation and support.

LINDSAY.

J. McAlpine, M.D., M.H.O.

During the past year we were fortunate in having only one case of smallpox, and that an imported one which was diagnosed in the early stage and immediately placed in quarantine and all precautions taken to protect the public, and it is gratifying to state that no other case developed, and it is especially so when we consider the enormous expense, inconvenience and personal hardship some of our neighbouring towns experienced through failing to deal promptly with the first cases. This should be a guide for the Board in dealing with other infectious diseases such as diphtheria and scarlet fever, which in my opinion are more fatal than, and therefore more to be dreaded than, smallpox.

Fifty families have been reported as having scarlet fever, and many of these families had several cases. There were only two deaths, which go to show that the disease has been of a mild type, but there is always the possibility that it may assume a severe or malignant type, such as visited the town in908. If more attention were given to the mild cases much of the ear and kidney disease which can be traced to scarlet fever would be prevented, and I am convinced that many cases of chronic heart disease have their inception in mild cases of scarlet fever, and if we are to judge from statistics and newspaper reports there is an alarming increase in the death rate from heart disease, so that every effort should be put forth to trace the cause of the increase.

Scarlet fever should and could be stamped out as readily as smallpox. It is a preventable disease and should not exist in our midst.

I would advise the Board of Health to provide a Convalescent Home, where all cases could be cared for during the peeling stage, thereby concentrating the infection in one place instead of having a number of centres of infection.

Typhoid fever showed a gratifying decrease during the year. In 1908 there were thirty cases admitted to the Ross Memorial Hospital, of which fifteen originated in town. Since January the 1st only fifteen cases were admitted, eight of which belonged to Lindsay, and on careful investigation it was found that all the cases actually originating in town were from families using well water, not a single case was traceable to the public water supply. That the citizens of Lindsay have not been slow to appreciate the boon of pure water is shown by the increasing number of applications for town water, there having been twice as many applications as in any previous year, and citizens are loud in their praise of the enterprise of the Board of Water Commissioners in being the first to adopt a method of water purification which is cheap and efficient, far more so than any other known method. Practical tests of the ozonized water were made during the summer by Dr. Archibald of the University of Toronto, which showed a removal of all intestinal germs and a reduction of the water bacteria to less than 20 per c.c. On the strength of this showing the Water Commissioners had the plant enlarged, so that at the present time it has a daily capacity of a million and a half gallons. All the water admitted to the mains for fire, lawns, manufacturing and all domestic purposes is thus purified and the mains saved from contamination at all times.

There were seven cases of diphtheria with two deaths, those two being in an advanced stage before medical aid was called, and even though antitoxin was freely used it was of no avail; but by the free and generous supply of antitoxin by the Board to families who could ill afford to provide it, several lives have been saved.

There has been considerable discussion as to the advisability of paving the streets. To my mind it is a sanitary question that you as a Board should seriously consider. The Lindsay mud during the spring and fall and the dust during the summer would be materially lessened by having the leading streets paved, and I feel quite certain that when the Suffragettes win, among the first reforms will be good drainage, paving of the streets and a general crusade against filth, mud and dust which women innately abhor. I wish to thank you for your cordial and generous support during the past year, also the Sanitary Inspector for his prompt and faithful assistance.

SARNIA.

A. C. Poussette, M.D., M.H.O.

In accordance with instructions contained in the Medical Health Act I beg to report as follows:—

The santary condition of the town has been carefully looked after during the past year, both by myself and the Sanitary Inspector; but notwithstanding the care taken to have all nuisances abated and the excellent sewer system which we have, there has been a great prevalence of zymotic disease during the past year. In the early months there were some cases of Scarlet Fever and Diphtheria, and later on Typhoid Fever was very prevalent, but it was not until the beginning of November that we had an extremely severe outbreak of Scarlet Fever and Diphtheria. During the last three months I have had thirty-three (33) houses quarantined for Diphtheria and sixteen (16) for Scarlet Fever, and I am not able to state exactly how many persons were affected for the reason that when once the house was placarded, subsequent cases in the same house were seldom reported by the attending physician.

A majority of those attacked have recovered, and so far as I know there have only been two deaths. There are still twelve (12) houses under quarantine, and a few of these are new cases that have occurred during the last two weeks. A large portion of my time during the last two months has been taken up by this epidemic, and Inspector Harris has been kept continually on the run and the end is not yet.

On or about November 18th I had the Devine Street Public School closed as, up to that time, nearly all the diphtheria cases were from among the pupils of that school. On November 20th every part of the school was thoroughly disinfected.

On December 16th I closed the Durand Street School, as several cases of Scarlet Fever had broken out among the scholars of that school. The Board of Education have undertaken to have all the schools disinfected during the vacation.

During the year that has now all but passed away I have been employed on Board of Health business portions of one hundred and nineteen days.

I have made thirty-one visits and inspections. I have attended five meetings of the Board and three of the Executive Committee. I have during the year written and sent out thirty-seven letters and cards. I sent several samples of water taken from different hydrants in town to the Laboratory of the Provincial Board of Health for examination. Some were found to be satisfactory and some not.

On the twenty-first (21st) of September I tested twenty (20) samples of milk taken from the vendors supplying the town, and had the results published.

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